MIRROR
OF THE
PATENT OFFICE.

BY

JOHN HANCOCK.

1846.

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UNITED STATES PATENT OFFICE

CASE ---------- SHELF ----------

L. M. R.

The American Journal of Improvements in the Useful Arts, and Mirror of the Patent Office.

By John Hancock.

Washington

1846

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AMERICAN AND FOREIGN PATENT AGENCY.

JOHN HANCOCK,

Counsellor and Attorney at Law,

AND SOLICITOR FOR PATENTEES,

No. 16, WALL STREET, over Adams' & Co's. Express Office,

NEW YORK.

Commissioner for Pennsylvania.

GOVERNMENT CLAIMS.

J. H. having the aid of eminent corresponding counsel, will prosecute Claims, or attend to any business connected with the Government Departments; the obtaining of Letters Patent, Pensions &c., or give any counsel relative thereto.

The Mirror of the Patent Office and Journal of American Improvements.—We are glad to welcome a periodical which promises so much utility in its design as this. Eminently useful as it is in its object, it must become an important agent in developing the sciences and arts in our country, and in giving its inventive genius an impetus and a reward gratifying to all. It purports to be a faithful epitome of American art, and the present number is filled with authentic descriptions and illustrative drawings of important and useful inventions, and essays and selections of great interest. Its contents are diversified and well arranged, affording copious mechanical, topographical, scientific reading of the most entertaining and instructive character. The editor introduces himself in a modest and well-founded essay, in which he evinces a mind thoroughly imbued with the right tendencies to command credit and success. With his own varied resources, he will bring all accessible aids, from an extensive scientific and literary acquaintance, to the right performance of his task.—*Galaxy.*

PATENT OFFICE, WASHINGTON.

SIR: A copy of the "Mirror of the Patent Office," has been received. I am happy to inform you, that I have carefully examined it, and am much pleased with the general plan and arrangement of the work, as indicated by the character of the contents which have already appeared. If it shall be ably and efficiently conducted, as I have no doubt it will be, it cannot fail to be of great service to that class of citizens engaged in inventive pursuits, and to the public generally.

I do not hesitate to assure you that it would give me great pleasure to render every proper aid and encouragement, comportible with my official position, to a periodical, such as you have commenced, published in this city, and conducted with ability and judgment, as I am confident yours will be. And I should deem it my duty, to give you every proper facility to obtain such information and other matter from the records and public archives of the Patent Office, as, in my judgment, would be valuable and interesting to the public.

And, if I should have any occasion to communicate with the public through the medium of a publication of the character of that in which you are engaged, devoted, as I understand it will be, exclusively to the promotion of science, and to general information concerning inventions, I should deem it a great privilege to be permitted to avail myself of such a medium, so convenient to me, and which would be a channel so appropriate for such communications. Hoping that your enterprise may be successful, I am very respectfully, your obedient servant,

EDMUND BURKE, Commissioner.

JOHN HANCOCK, Esq, Editor, "Mirror of the Patent Office," Washington, D. C.

THE

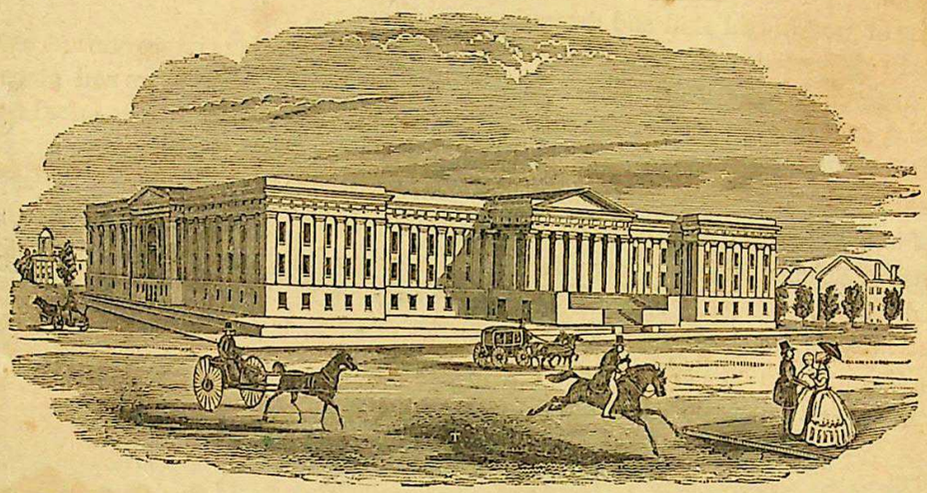
AMERICAN JOURNAL

OF

IMPROVEMENTS IN THE USEFUL ARTS,

AND

MIRROR OF THE PATENT OFFICE.



Containing authentic descriptions and illustrative drawings of the records, specifiications and models of the Patent Office;

BEING A FAITHFUL REPRESENTATION OF THE

STATE OF THE ARTS IN AMERICA:

Also, accounts of such inventions and discoveries as may be entertaining and instructive;

Original Essays and selections from American and Foreign Periodicals:

With an Appendix

Containing the Patent Laws, a Classification of the Models, and a continuation of the List of Patents and Patentees, and all the requisite forms and instructions to be observed by those applying for Patents

This Vol. is the property of the United States Patent Office.

19458

Published Monthly—For January—No. 1—Vol. 1.

BY WM. GREER, PRINTER, & O. H. THROOP, ENGRAVER AND DRAUGHTSMAN.

Edited by Scientific Gentlemen.

CITY OF WASHINGTON.

William Greer.

1846.

INTRODUCTION.

The Proprietors of the following Work are very forcibly impressed with the necessity which exists for a more general diffiusion of the knowledge of those improvements which Science in its successful labors, is now every where accomplishing through our extended republic.

The establishment of the Patent Office at the Capitol, the order, the arrangement and classification of the various Models there exhibited, and its easy access to all classes and conditions of society, guarantee to the industrious and the ingenious, a safe protection from the artful designs of the mere pretender to laborious investigation, or the idle imitator of professional skill and determined perseverance.

Their design in the present undertaking is to furnish a list of the various improvements submitted to the action of the Government through the Patent Office, together with appropriate engravings and plans;—to give the laws which do now exist, or may hereafter be enacted, affecting such improvements, and to afford from the researches of the Scientific, all improvements in the National Sciences, Agriculture and the fine Arts.

In this plan of utility and general informatien, they will be assisted by the learning, the experience, and practical information of many of their distinguished countrymen, whose highly valuable labors have already successfully advanced the cause of Science, and who have thrown a lustre around the American name, which no time nor circumstances can diminish.

They respectfully invite the support and eountenance of such, together with all who are desirous to extend the fame of their Country, which shall lesson the weight of human labor, which now falls on the few, and give to industry and application their highest reward.

Entered according to the Act of Congress, A. D. 1846,
By Wm. Greer & O. H. Throop,
in the District Court of the District of Columbia.

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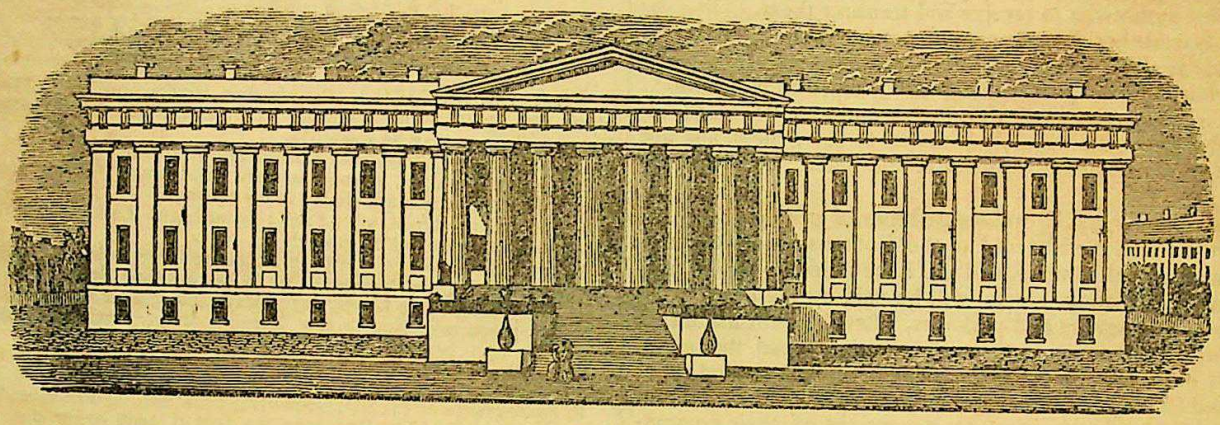
WASHINGTON CITY, D. C.



PATENT OFFICE AS IT IS.

The American Journal of Improvements in the Useful Arts, is intended to supply a want which is everywhere felt by those in any way interested in Patents and new Inventions: it will, therefore, be the medium of communicating every variety of information which can legally emanate from the Patent Office, through the facilities granted to the Publishers by the Hon. EDMUND BURKE, the present able and distinguished Commissioner.

Its leading feature will be, the regular publication of a list of all the Patents, which have issued from the Department during the preceding month, with highly finished engravings on Steel and Wood, of the most important inventions, accompanied by specifications and descriptions.

It will furnish a complete digest of all the Patents, (as far as the records go,) which have been issued since 1790, comprising the necessary information relative to renewals and assignments, together with the names and places of abodes of the patentees: and it will contain all the Patent Laws now in operation, with the forms necessary to be observed in applying for patents.

As the great interests of Labor, are all subservient to *Invention*,—Agriculture and Manufactures will engage an important part of its attention; and for the furtherance of these interests it will endeavor to co-operate with all the Mechanic, Agricultural, and Industrial Associations in the Union.

The use of its columns has already been formally accepted by the AMERICAN INSTITUTE of New York, and by the NATIONAL ASSOCIATION of INVENTORS. The Association of Inventors, comprising men of the highest influence and talents, is destined to bring about the most important results, relative to the long-neglected Inventor and Artificer, and it will be the earnest care of this Journal, while discriminating the principles of that Association, to assert the dignity, anp defend the rights of American Invention and artistic genius, to which are chiefly to be ascribed the intellectual elevation and the productive resources of our Country.

Engravings of Machinery will not appear in any of the following numbers, without a minute description or references, from the whole or part of the Specification attached to them; unless by request of the Inventor or owner of the same.

To make this Work more generally useful and interesting to all persons throughout the United States, the Publishers will devote a small portion of this work to the curiosities of the National Institute, which is hourly growing of vast importance and usefulness. It will well pay any person for a visit from any part of the United States. It is located in the upper part of the Patent Office.

At the close of this Volume, (the last number,) subscribers will receive a highly finished Title Page, both emblematical and Ornamental for the first Volume, with a Portrait of our able and distinguished Commissioner, both engraved in the very best style on Steel.

Communications from gentlemen of Science Arts, Manufactures, Agriculture, &c., &c., are earnestly solicited.

Subscribers have the privilege of having their Inventions or Improvements inserted gratis, by furnishing drawings of the proper size with a description or specification.

☞Editors, friendly to our enterprize, will oblige us by giving this prospectus a few insertions in their papers.

TERMS:

The AMERICAN JOURNAL, will be published monthly, printed in best Book style, on fine paper Royal Quarto Form, each number will contain *thirty-two* quarto pages, embellished with various engravings on Steel and Wood, at $5 per annum, *payable in advance*, or 50 cents per number, *payable on delivery*.

Postmasters and others, acting as agents, shall receive one dollar for each subscriber whose name is forwarded with the money. Any person remitting 20 dollars, shall receive five copies; 50 dollars, 14 copies; which shall be sent according to order. No orders will be accepted without the accompanying cash.

REGULATIONS RELATING TO POSTAGE.

PATENT OFFICE, *June* 11, 1845.

In consequence of the heavy correspondence of the Patent Office, (which is supported exclusively from its own revenues,) all of which will be subject to postage on the 1st day of July next, the undersigned feels obliged to give notice that, after the 30th day of June, instant, all letters and packages addressed to the Commissioner of Patents, not expressly relating to the business with which this office is, by law, charged, must be *post paid,* or they will receive no attention, and *will be returned to the post office.*

Models, which have heretofore occasionally been sent by the mail, must hereafter be sent by private conveyance, and at the expense of the applicant, except when delivered to the agents of this office authorized to receive and transmit them.

Letters containing assignments of patents to be recorded in this office, (as the recording is done at the expense of the office without charge to the persons interested,) must be *post paid.*

All letters requesting copies of papers and records, seeds, reports, and other matters merely personal to the writers, and not relating to the legitimate business of the office, must be *post paid.*

Fees for copies must be transmitted free of postage.

Postage on letters addressed to the Commissioner, on business connected with caveats, and the issue of letters patent, and all proceedings relating thereto, will be paid by the office.

As postage on letters and packages, after the 30th instant, is to be charged according to the weight, it is desired that applicants will omit the use of wooden rollers, tin cases, and other things used for the convenience of transmission, which, without being necessary, greatly increase the weight of their communications, and consequently the postage charged upon them.

EDMUND BURKE,
Commissioner of Patents.

PATENT OFFICE.

Rules for taking and transmitting evidence, &c., to the Commissioner of Patents:

1st. That all statements, declarations, evidence, &c., shall be in writing, setting forth minutely and particularly the points at issue; and shall be verified by oath or affirmation.

2d. That all statements, declarations, proofs, and evidence, shall be verified by oath or affirmation.

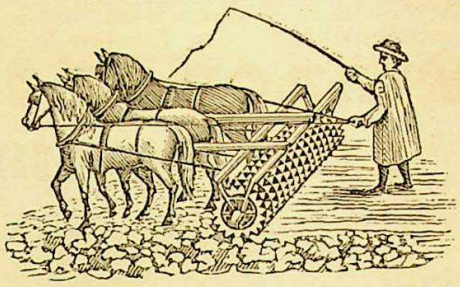
3d. That before the deposition of a witness or witnesses be taken by either party, notice is to be given to the opposite party of the time and place when and where such deposition or depositions will be taken; so that the opposite party either in person or by attorney, shall have full opportunity to cross examine the witness or witnesses. And such notice shall, *with proof of service of the same*, be attached to the deposition or depositions, whether the party cross-examine or not; and such notice shall be given in sufficient time for the appearance of the opposite party, and for the transmission of the evidence to the Patent Office, before the date of hearing.

4th. That no evidence, statement, or declaration, touching the matter at issue, will be *considered* upon the said day of hearing, which shall not have been taken and filed in compliance with these rules: Provided, that if either party shall be unable, from good and sufficient reasons, to procure the testimony of a witness or witnesses, within the above stipulated time, then it shall be the duty of said party to give notice of the same to the Commissioner of Patents, accompanied with statements of the cause of such inability, which last mentioned notice to the Commissioner shall be received by him days previous to the day of hearing aforesaid, viz. the day of next.

5th. That all evidence, &c., shall be sealed up and transmitted to the Commissioner of Patents by the persons before whom it shall be taken, and so certified thereon.

EDMUND BURKE,
Commissioner of Patents.

TO AGRICULTURISTS.



WILLIAM CROSSKILL, *Beverly Iron Works, near Hull, Yorkshire. April 15th*, 1845.—The following are the various uses to which his PATENT ROLLER may be applied:—

1. For Crushing Clods, after Turnip Crops, to sow Barley.
2. For Rolling Corn, as soon as sown; and upon Wheat Lands sown late in the year, which are cloddy in the Spring.
3. For Rolling Wheat, after Frost; upon Light Land, in the Spring; when the Plants are out of ground.
4. For Rolling Barley, when the Plants are three inches out of ground.
5. For stopping the Ravages of the Wireworm and Grub.
6. For Rolling Grass Lands, and Mossy Lands, after Compost.
7. For preparing Land to sow Turnips, Clover, and fine Seeds. It makes the finest bed imaginable for small Seeds.

Cash Prices, with Travelling Wheels complete, delivered in Hull, 6 feet 6 inches, 21*l.*; 6 feet, 19*l.* 10s.; 5 feet 6 inches, 18*l.*

In consequence of the enormous advance in iron, and its already making a difference of Five Pounds in the cost of each larger size Roller, it is intended, after due notice being given to the Agriculturalists, to advance the price of the Patent Roller Three Pounds each size.

A model of the Roller is exhibited at the Royal Polytechnic Institution, London.

The above we clip from a late English Agricultural Paper, and for the many uses it may be applied to, and the rapid sale, as the reader will perceive, it has met with in England, in a short time, induces us to give it a place in our Journal. Believing it to be a very excellent machine, and well adapted to a great portion of the Soil of the United States.

The Roller is of Cast Iron, cast in sections, placed upon a shaft with an Iron frame that is attached to the same, the different sections are crowded on and the end ones fastened—they may be reduced to suit the strength of the team.—EDITORS.

A DANGEROUS SECRET.

In a former letter, I have mentioned the improvement in art, which has been effected by tranferring engravings, etc., to plates of zinc, and which is called glyptography. A still more wonderful effect, resembling this, has lately been produced in Prussia, the process of which, however, is still secret. The attention of the King of Prussia, and his ministers and councillors has lately been called to it. An inhabitant of Berlin is represented as having discovered a method of producing, in the most perfect, easy and rapid manner, exact fac similes of documents and writings of every kind, bank notes, and, in short, of every paper document, whether written or printed. The most surprising part of the thing is, that the inventor requires, to execute the copy, no more time than an ordinary printer would take to make an impression with a common press.

One of the public functioners of the government gave the inventor an old document to copy, which seemed, from its age and worn condition, incapable of being imitated. The artist took it to his *atelier*, and in a few minutes returned with fifty copies of it! The imitation was so perfect, that it filled the monarch and his council with astonishment, amounting to stupefaction and even fright! At the foot of this document were affixed a great number of signatures, which it had received at various epochs more or less remote, all very old, and written in different inks. The copies gave all these, with the most exact precision.

Several Treasury notes of the highest value were then given to the inventor, to be copied.—He took them, as before, and returned after some minutes, having mixed the originals with the copies, and invited the most competent judges of such documents to select the originals from the collection! It was impossible to do it!!—The government are negotiating with the inventor for the purchase of his secret.

SYNOPSIS OF FEES, &c., FOR PATENTS IN FOREIGN COUNTRIES.

The British dominions.

The United Kingdom of Great Britain and Ireland is divided into three countries, for each of which separate patents must be obtained by any inventor who wishes to protect his invention throughout the whole of the British dominions: one for England and Wales, in which may be included the British Colonies and possessions, by the petitioner signifying his intention to that effect; one for Scotland; and one for Ireland.

The average *ordinary* cost, if unopposed, and passed in the usual manner, without extra fees, will be, agent's commission included, as follows:

For England, Wales, and colonies, &c., about	$5 50
For Scotland	3 90
For Ireland	6 25
Three specifications	2 00
Total	17 65

The inventor or applicant for patents is not required to give a *detailed* description of his invention. He has only to sign a declaration before a master in chancery to the title of his invention, and he receives, after due proceedings are had, a grant of letters patent; after which, he has a certain time to specify—usually 6 months.

Applications for patents are sent from this country to England to an agent, who takes out the patent in his own name, and then sells or transfers the right, as the inventor directs. A patent of this kind is taken out as a communication from a foreigner abroad. Patents are granted for 14 years.

France.

Patents are granted in this country for 5, 10, or 15 years, at the option of the patentee. The application must be accompanied with a perfect description, written in the French language, and two sets of drawings. The term of a patent cannot, after it is granted, be extended. Every invention must be worked within 2 years after the date of the patent; otherwise, it may be cancelled. The cost will generally amount to about $300, and agent's fees. If a patent is taken out in any other country subsequent to the date of the patent in France, the patent in France is void.

Belgium.

Patents for foreign inventions are not now granted for a longer term than 10 years, and sometimes they are restricted to 5 years, they may be prolonged, however, for a few years, by applying before their expiration. The invention must be worked in Belgium; and if the patentee imports any similar articles to those he has patented, the grant is liable to be rescinded. The specification must be written in the French language, with two copies of drawings. The invention must be worked within 2 years after the grant, or be liable to forfeiture.

Holland.

The specification written in English, and accompanied with two copies of drawings, may be sent with the application for patent in this country, which is granted for 5, 10, or 15 years, (as the applicant desires,) if it does not extend beyond the term of a foreign patent for the same thing; but a patent may be obtained for 5 years, and afterwards extended, if required, to a longer period.

Austria.

The specification must be made in German, and illustrated with drawings, if necessary. A patent can be obtained for 5 years, and afterwards extended to any time not exceeding 15 years in the whole. The invention must be worked within one year from its date, or be liable to forfeiture.

Prussia.

This Government exercises a discretionary power in granting patents. A complete specification and drawings are required; but no tax is charged, except a trifling sum for advertising, &c. Patents are granted for 5 years, and sometimes longer; and the invention must be put in practice within 6 months.

Russia.

Patents are granted in this country at the discretion of Government, by which their duration is fixed, which is for 3, 5, or 6 years; and to insure their validity, they must not have been published in any country previous to the application here. The price for a foreign invention is, for 1 year, 60; for 2 years, 120; for 3 years, 180; for 4 years, 240; for 5 years, 300; for 6 years, 360 silver roubles. A silver rouble is about 75 cents.

Spain.

Patents of importation or introduction are granted in this country for 5 years, if no description can be found in the Conservatory of Arts in Madrid; or for any invention, the description of which has been deposited there for more than 3 years, and not publicly worked in Spain.

N. B.—In foreign countries patents are granted to those who introduce them, as well as to the inventors; but in the United States, the inventor or assignee can alone take a patent. If the inventor is a foreigner, the fee is for a foreign patent.

THE WOOD-PECKER SAW MILL.

We are now about to give our planters an account of a very important labor saving machine, and we beg of them a patient hearing. Fortunately the inventor of the Wood-Pecker Saw Mill did not live before his age. Automatic *steam* saw mills have been in use several years, and it will be easy to convince the public that an automatic saw mill may go by mule power! Within a few years great improvements have been made in saw mills. It was a great discovery, that of rendering the sawing of lumber, from the time the log is put on the carriage, until it is cut up, an automatic operation. It was patented in 1802, but was not adopted in practice until *thirty years* afterwards! Mills of this description are now in general use, but the machinery is so complicated and the power necessary, not only to move the log but to saw it, is so great, that but very few planters can afford to saw their own lumber. Within the last three or four years, a Mr. B. Arnos, of Connecticut, has so simplified the machinery of saw mills, and reduced the power necessary to cut the wood, that they require about the same power to run them that is required by a fifty saw gin or a common corn mill! The Wood Pecker Saw Mill, as improved by Mr. Minor, now of this place—who has put up many in Alabama—is so constructed as to be easily attached to an engine or to a common mill house with horse power, without any extra building. We have conversed with several gentlemen who have seen those mills in operation. One of them, with four horses or mules and one man and a boy, will saw *fifteen hundred feet of* cypress lumber per day. Mr. Minor informs us that he can build the Wood Pecker Saw Mill and a Grist Mill together, so that the Saw Mill would not cost more than the Corn Mill separate; and the Saw Mill and Corn Mill built together would only cost a hundred dollars more than the Saw mill alone—one building and one running gear answering for both mills. At this rate any planter can afford to have a Saw Mill. The machinery is very substantial and not liable to get out of order. Mr. Minor, we know, is a very ingenious mechanic, and his terms are quite liberal. He has already made two or three contracts for mills, in this Parish, and is now on his way to Mobile for materials. We will, with pleasure, furnish planters with full particulars, as to cost, &c., as Mr. Minor has left a lithograph at our office, with all necessary information.

THE MANUFACTURE OF SUGAR.

The enlightened sugar planter has always felt that the plans pursued in manufacturing the juice of the cane, are extremely defective; that numerous difficulties are encountered, and many accidents are constantly occuring, which cannot be avoided by any degree of foresight or skill, while the absence of these qualities cannot fail to accumulate those evils tenfold. A scientific view has too rarely been taken of the subject and instead of improvements and reforms, founded on a chemical acquaintance with the nature of cane juice and of the causes which produce the evils sought to be remedied, only paliatives and expedients have been offered.

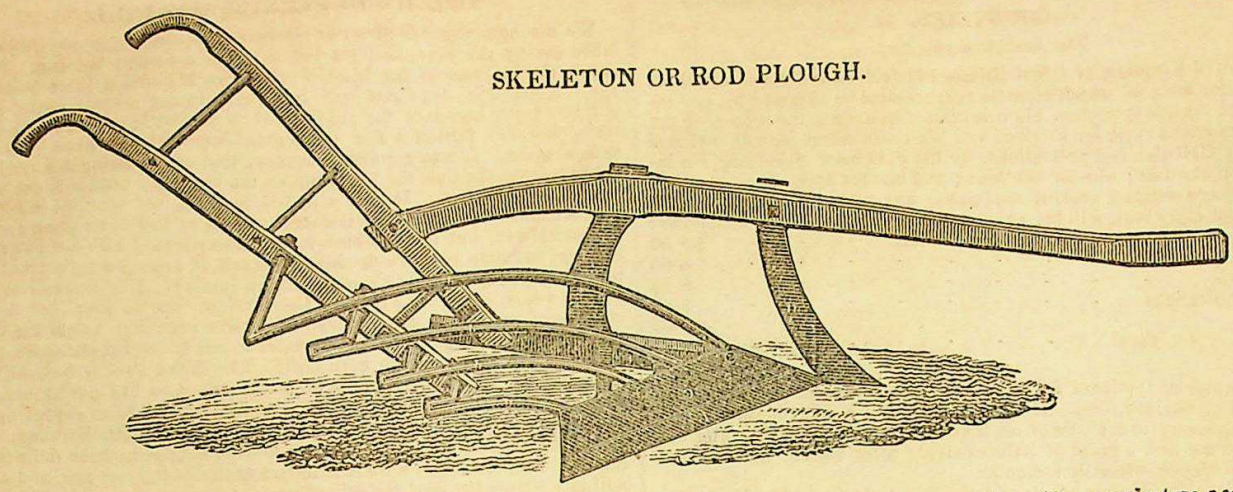
There are two kinds of impurities in the juice—the one chemical, the other mechanical: the latter can be removed by mechanical means, but the former being actually held in solution, and in internate union, can only be extracted by a chemical action; this Mr. DeBretton accomplishes by a chemical preparation, which combining with the chemical impurities, forms with them an insoluble compound, that reduces them to the state of mechanical impurities, which can be separated by filtration. The most abundant of these chemical impurities approach to what is called by chemists *extractive* matter; the others are tannin and gallic acid, which have existence in the cane juice. All these form insoluble compounds with, and are precipitated by, certain chemical compounds used by De Bretton, the discovery of which must be of the highest importance to the planter.

After the juice has safely arrived, free of all taint from the mill, the difficulties of converting it into good sugar arise from the following causes: First, from the improper use of temper.—DeBretton shows, by the use of his chemical preparations, how to regulate this with methodical exactness, and how by his process of filtration and precipitation, to get rid of the feculencies: this is another most difficult, and, in general, most imperfectly performed task, and proves another important cause of the bad quality of sugar. Another, and very vital cause of bad sugar—the cause that prevents it standing a sea voyage, or jolting—is the imperfect mode of curing, and in this respect DeBretton's plan is also a decided and unquestionable improvement.

Portable Flour Mills.—Among the best machines exhibited at the Fair, we particularly noticed Fitzgerald's Portable Burr-Stone Mills, manufacted by Charles Ross.

The whole occupies only the space of a side board, and any kind of power may be easily applied to move it. The stones are conical, and one works into the other. The outer being only about a foot in its largest diameter, they are cheap and light, yet supply the place of the costly and ponderous old-fashioned grist-mill stones and their extensive connections. We are assured that they will do an equal amount of work, yet the cost of the whole is only $40.

SKELETON OR ROD PLOUGH.



The above cut, is a representation of H. H. May's Skeleton Plough, for breaking greensward land. It was invented to overcome the difficulty and expense of breaking the Western Prairies, but is found to be admirably adapted to all kinds of greensward ploughing.

The post and land-side are made of cast or wrought iron, to which is attached the beam and left hand handle. From the the land-side projections, or arms, extend in a triangular form to sustain the share and forward end of the rods.

A represents the Share made of a plate of Steel, the front edge drawn to any required degree of sharpness, and is placed in a notch or stepping on the upperside of the front Arm.

B B B B, represents the Rods. They are tapered at one end, and attached to the front arm, back of the near edge of the share B; the other end extending a few inches back of the right hand handle, and are bent in the proper form for conveying the furrow. Screws are rivetted to the rods, and pass through the right hand handle, with burs or nuts on each side of the handle, by which the rods can be drawn towards or pushed from the handle, to correspond with the width of furrow to be turned.

C represents a thin plate of Steel drawn to an edge, and fastened to the arm by bolts, back of the near edge of the Share A, and forming with the front edge of the arm a vice or clamps, holding the Share firmly to its place, and the near edge of the plate C, covering the end of the rods.

D. represents the Coulter, attached to the beam and point of the Share.

In moving the Plough, the furrow is cut by the Coulter D and Share A, and carried across the plate C, and is perfectly turned by gliding with an easy motion lengthwise on the rods B B B B.

The advantages of this Plough are:—the facility of taking the Share from the vice to be sharpened and returned, or replaced by another—the security and firmness of the Share when in its place—obviating friction by the use of rods instead of the mole board—moving the rods by means of the screws, to correspond with the width of furrow, and lay the furrows edge by edge,—(or lay the edge of one furrow on the edge of the preceding one,—or extend the rods so as to break the furrow, and leave it in a rough state,)—the great ease with which the Plough is managed and drawn by the team,—and its simplicity of construction and durability.

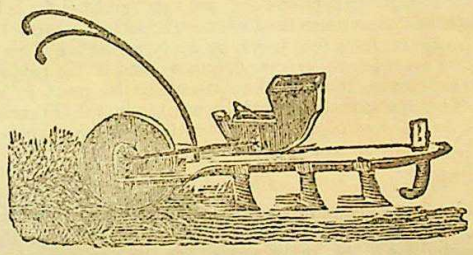
These Ploughs are recommended in the highest terms by practical farmers in sections of the country where they are introduced. And we are assured that in the Western country, as much prairie can be broken per day, (frequently two acres,) with one of these Ploughs and one span of horses, as used to be done with the old kinds of Ploughs, and four, five, and even six yoke of oxen.

We express our decided opinion that the agricultural interests of the country, will be greatly advanced by the introduction of these Ploughs into general use.

Washington City, October 23d, 1845.

IMPROVED SEED AND CORN PLANTER.

(Particularly adapted to the planting of Rice.)

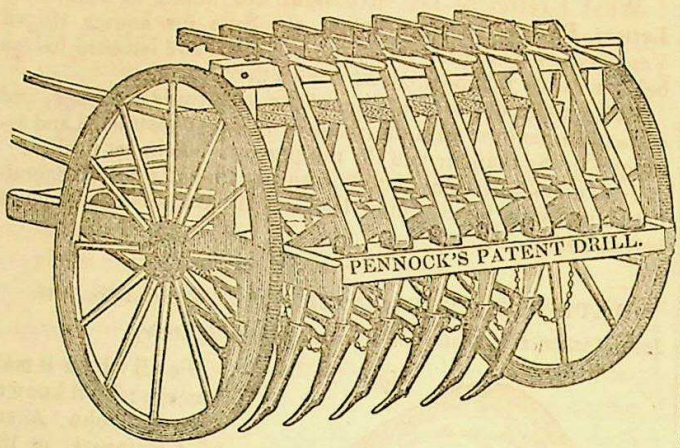


This is a small but most useful machine, adapted to the planting of corn, and sowing beets, parsnips, carrots, turnips, &c. It makes the furrow, drops the seed, covers and rolls at the same time. In dropping corn, it can be graduated so as to deposite the grains at any desired distance, as well as in any particular number, and such is the exactitude of its mechanical arrangement, that it is unvarying in both results, and this must be admitted to be a desideratum of great moment. It will perform 10 acres of good work per day.—Its price, with belts for all kinds of seeds, is $25. Manufactured by Mr. George Page, Washington City, D. C.

New Railway Carriages.—The Southwestern are constructing a new set of carriages at their establishment, Vauxhill, on an improved plan. In the first-class carriages the seats are formed with springs, and the back linings provided with the same, being so elastic as to afford every comfort, and in the event of accident to cause a diminution in the shock. In addition to the usual door and side glasses, there is a light frame composed of very fine wire gauze, neatly painted, and which, when it is found necessary to lower the glass for the admission of air, may be raised up, and so answers the two-fold purpose of admitting air and of avoiding dust. The Interior is provided with two lamps, and the carriage is mounted upon painted wooden wheels of a superior construction. Their safety has been tested on several occasions. They possess the advantages of making very little noise, and are devoid of a disadvantage which characterizes wheels with spokes. In the second-class carriages, to which the improvement has also been extended, side lights and doors have been provided similar to those of the first-class, but it has not the gause frame. The third-class carriages are of substantial make.—*Chronicle.*

PENNOCK & SON'S PATENT DRILL.

(For Sowing Wheat, and other Grain.)



We copy the following from the Farmers' Encyclopedia:—

An admirable Drill for Sowing Wheat, has been invented and Patented by Moses Pennock and Son Samuel, of Kennett Square, Chester County, Pennsylvania. It has been used for several years, in the southern parts of Pennsylvania, and adjoining States, and the greatest satisfaction has been expressed for its performance.

Pennock's Drill is capable of Sowing 8 acres of Wheat, or planting 15 acres of Indian Corn per day. The Wheat is placed in boxes, connected with sowing tubes which penetrate into the ground, scattering it in rows nine inches apart, and covering about an average depth of 2½ inches.

If one or more of the tubes comes in contact with a stone, or a root or other obstacles beneath the surface, a small chain to which it is attached breaks a wooden peg, and thus saves the Machine from any serious injury, the detention being only a few moments, when pegs are kept on hand.

The preparation of the ground is similar to that adopted in the broad-cast method.

The machine is drawn with great ease by one horse, and requires but one attendant in Sowing Wheat. For every bushel sown by hand in the ordinary way, the Drill saves from 8 to 12 quarts. The machine is easily managed and not liable to get out of order. Besides covering the Wheat much more effectually than can be done by the harrow, it raises ridges about three inches high on each side of the tubes. These ridges crumble down by the action of the frost and rains, and thus cover the young plants and prevents them from being thrown out during the freezing and thawing of the ground and killed, as so commonly occurs in the winters of the United States. Samuel Pennock, the junior inventor, has for several years been using the Drill extensively in putting in crops. His usual charge for the use of a machine, including the Horse and his own services, is $4 per day, or 50 cents per acre.

When Wheat sells for $1,25 or $1,50 per bushel, the seed saved will pay all expenses of drilling, (especially when the Farmer owns the drill,) the crop being placed in a far better condition than can be effected by the broad-cast method, as will be evident from a consideration of the various advantages enumerated, and these constitute the chief profit. When the machine is used for planting Indian Corn, (for which purpose it is singularly well adapted,) some of the levers are thrown out of gear, leaving the remainder so arranged as to strike out two rows 4½ feet apart, in which the Corn is dropped at regular distances and covered with about 3½ inches of earth, or less if desired. It may be afterwards thinned, but must of course be always tilled in one direction. The ground is flushed and harrowed, after which rows 9 feet apart are run with a plough and one horse, in which rows the horse drawing the drill walks in going and returning. In this way about 15 acres of Indian Corn may be planted in a day, and thus a considerable saving of labor is effected by the owner of a drill, since to plant the same number of acres by hand, in the usual way, would require 5 hands, equal to 15 days work, with the addition of a second plough to run out furrows, and two droppers. Although Pennock's Drill costs $100, it seems evident that the saving of labor in planting the Corn crop, will more than pay the interest and wear and tear of the machine, leaving none of those charges to be placed against the Wheat crop. Persons who have watched the progress of Corn crops planted by the drill, and compared the results with those crops planted by hand, say, that under ordinary circumstances, a gain of 5 bushels per acre, may be fairly credited to the drilled Corn. Some even go so far as to say that drilling has added one-fourth to the crop.

The deep covering is regarded, where the soil is perfectly dry and of a light texture, as a very great advantage. The corn will at first appear backward, but is soon observed to catch up and outstrip that which has been covered more superficially. It is also placed more out of the reach of birds, and escapes injury from the *cut-worm* and *heart worm*, or as it is also called *bud-worm*. The cut worm usually commits its depredations by night, taking off the plants at, or very near, the surface of the ground, whilst by day it cuts a little below the surface. Now, when Corn is deeply covered it admits of being topped without being entirely killed, and suffers little further injury than retardation. Pennock's drill, besides sowing beans, peas, and all kinds of round seeds, including rutabaga is, like Cook's English Drill, capable of being adapted to the purposes of a horse-hoe cultivator, extirpator, and harrow, by the adjustment of hoes, harrow-teeth, &c. Besides the approbation bestowed on Pennock's drill, by individual farmers for some of whom they have sown as much as 100 acres a season, several public institutions have awarded premiums to the inventors, amongst which we may mention, the Philadelphia Agricultural Society, the Franklin Institute of Pennsylvania, and American Institute of New York.

It would be a desideratum in the United States to have Drills like those used in England, adapted to sowing seeds and sprinkling with them at the same time, some of the concentrated manure, such as bone-dust, poudretts, &c. But this again like every other addition must increase the cost, already so great an obstacle.

As yet the Drill system in the United States, has been principally confined to sowing turnips and beets, and some times Indian Corn. The result with many who have had good implements, and know how to use them, has been a conviction of their utility and economy, especially where the root culture has been extensively carried on. One-rowed drills are almost the only kind to be met with in the ware houses where agricultural implements are kept for sale.

"We are informed," says the *Norfolk News*, "that a machine has been invented by an ingenious man in this county, the object of which is to supersede the use of gates on railways where they cross the public roads. It is so constructed that an engine or carriage approaching it at the distance of sixty or seventy yards will cause it to open in the case of the accidental absence of the attendant; and when closed, it entirely conceals the railway from the sight of horses, and thus prevents the annoyance and danger too often incurred in crossing the lines. The mechamism is very simple and ingenious.

(SEE PLATE I—FIGURES 1, 2 and 3.)

LETTERS PATENT DATED APRIL 17th, 1844.

WARREN C. CHOATE, *Washington, District of Columbia.*

The schedule referred to in these Letters Patent and making part of the same:

Be it known, that I, Warren C. Choate, of the City and County of Washington, and District of Columbia, have invented a new and improved mode of cutting, fitting, and rigging Sails to square rigged Vessels, and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification in which figure 1, is a drawing of the front of the sails, &c. Figure 2, after side.

The construction is as follows,—the yards are furnished with round iron rods (*a*,) which extend from the slings of each yard, outward on both sides to the sheeve holes for the top sail sheets, or top gallant sheets, near the end of the yard arm; these rods are denominated jack-yards, they are secured to the yard in front thereof, at the ends by iron bands (*b*,) which are put around the yards and have a goose neck (*c*,) see figure 3, detached projecting from them, to which said jack-yards are fastened at a sufficient distance from the yard to permit the rings or hanks, to which the sail is bent, to run out and in freely upon them. The rings or hanks, are in number sufficient to bend the sail to, and sustain it when spread; to each of the inner goose necks (*c*,) which holds the inner ends of the jack-yards, is fastened the upper end of a jack-stay (*d*,) which runs down parallel with the mast, those for the fore and main sail being set up to ring bolts (*e*,) on the deck, or they can be shifted forward. There is an iron band *f*, fitted round snugly to the cheeks of the lower mast between the tops and trusses, from this band, an arm g, projects on each side of the mast, out forward over the lower yards, far enough to clear the top: the end of each arm is formed into an eye through which the top sail jack-stay (*d*) passes, it is then carried back under the top and through another ring or leader (*h*) at the mast, and from thence down on deck; this jackstay may be set taught by a two or three fold pully. The lower ends of the top gallant jackstay (*d*,) can be set up to an eye bolt (*i*,) on a band round the top mast, between the top mast cross trees and the sheeve hole for the top sail tie. On all the jackstays are rings or hanks for bending the sail to, similar to the manner employed on the jack yard. By the above it will be seen that all the sails are in two parts, the starboard and larboard halves of the Sail being entirely independent of each other.

The head of each Sail is bent unto the rings or hanks on the jackyard which run out and in thereon; an out hauler (*k*) is bent to the outer head cringle (*k*,) and runs through a block (*l*,) on the outer end of the yard arm, and thence through a block (*m*,) near the centre of the yard, from which it descends to the deck; by this the Sail is hauled out: an inhauler (*n*,) is also bent to the outer head cringle, and runs through the rings or hanks on the jackyard, and thence down on deck, by which the head of the Sail is hauled into the mast, assisted by brails (*o*,) and the Sail is hauled in and furled like a tri sail or spanker; I use but one reef in the top sails, which is the close or storm reef; an inner reef pendant (*p*,) is made fast to the inner reef cringle (*q*,) and running up to the yard near the slings passing through a leader (*p*,) is brought down to the deck; an outer reef pendent (*r*,) is made fast to the outer reef cringle (*r*,) and runs up through a block or sheeve hole, at the end of the yard, then in through a sister block (*s*,) in the top mast rigging, and thence down on deck; two reef ropes (*t*,) are also attached at equal distances on the reef band (*u*,) which run up to the yard, and then into the rim of the top, and thence down on deck, these reef ropes haul the reef band snug up and along the yard. If the top sail yard is on the cap, and the reef cringles are hauled up, and out, by the reef pendants, and the reef band hauled snug up to the yard, you have an excellent reef in a heavy storm; by this method you have two close reefed top sails, (*i e*,) a starboard and a larboard, either of which can be taken in, or set, with the greatest safety, without interfering with the other.

What I claim as my invention, and desire to secure by Letters Patent, is constructing the Sails for square rigged Vessels in two separate parts, the starboard and larboard halves being entirely independent of each other.

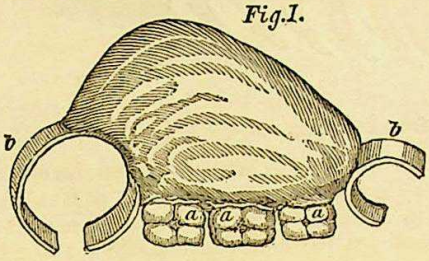
I also claim the combination of the jack-yards and rings, and *out* and *in* haulers, with the yards of vessels constructed and arranged in the manner and for the purpose herein set forth.

I also claim in combination with the above, what I denominate a jackstay, for the inner leach of the Sail to traverse on as herein described.

LETTERS PATENT GRANTED DECEMBER 16th, 1845.

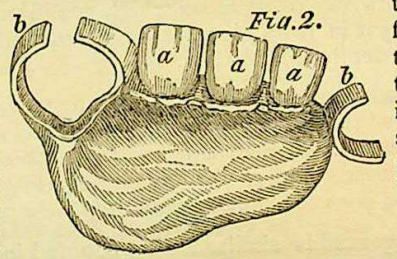
JOHN ALLEN, *Cincinnati, Ohio, Improvement in Dentistry.*

Fig.1.



To all whom it may concern: Be it known, that I, John Allen, of Cincinnati, in the County of Hamilton, and State of Ohio, have invented a new and useful method or process for restoring the natural feelings and contour of the face in cases where the cheeks have fallen in, in consequence of the loss of teeth, absorption of the avealar processes, wasting of the flesh, or loss of the maxillary bones; and I do hereby declare the following to be a clear, full, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification. I, in the first place take an impression with soft wax, of the hollow parts of the face opposite which the cheek is to be restored to its natural feelings; from which I take a plaster cast, and from the plaster cast I form a strong metal cast for the purpose of stamping a thin metallic plate to fit the defective parts of the jaw. I then place the plate thus formed into its proper position in the mouth and mould upon it softened wax, sufficient in quantity to fill out the cheek to the rotundity that may be desired. The plate and wax united are then removed from the mouth, and a cast is made of the wax as before described,—from which a second plate is formed of the same shape of the wax to fit the cheek. The two metallic plates thus formed, (the one adapted to the jaw, and the other to the cheek,) are united and soldered together into a hollow bulb, to which artificial teeth may be attached, (if any should be required,) and the whole secured in the mouth to the jaw bone or natural teeth with clasps, springs, or any other suitable and proper manner, as the state of the jaw may require. In the accompanying drawings, figure 1 is a top view, and figure 2 is a view of the underside of the bulb attachment before described, with the teeth *a a a*, attached to the same; *b b*, are clasps for attaching the bulb to the natural teeth—the same being a fac simile of a bulb applied and fitted by me to a gentleman's mouth, by whom it is now worn.

Fig.2.



What I claim as my invention, and desire to secure by Letters Patent, is the manner of restoring hollow cheeks to their natural contour and rotundity, by means of metallic bulbs, formed, fitted to, and secured in the mouth substantially in the manner herein set forth, or by any similar attachment secured between the jaw bones and the cheeks.

From the Saturday Courier.

SUSPENSION BRIDGES.

The proposed construction of a Suspension Bridge at the Falls of Niagara, is at present exciting a general interest. It may, therefore, be interesting also to notice two Suspension Bridges which have lately been erected in the United States and in our own Pennsylvania.

The one, the now well-known and beautiful Suspension Aqueduct Bridge over the Allegheny River at Pittsburg,—designed and constructed by Mr. John A. Roebling, Civil Engineer of that city.

This work is 1150 feet long—the trunk is of wood, and suspended by two huge wire cables, of 7 inches diameter. These cables are the most important part of the whole structure. They are formed of an assemblage of wire which are compactly united by a strong, close spiral and continuous wrapping of the same material—which wrapping was laid on by a machine of ingenious construction, the invention of Mr. Roebling. This feature is considered, and is a most decided and important improvement in the making of the wire cables—as it affords a perfect protection against oxidation—adds to the strength, and much improves their appearance.

On a close examination of the Aqueduct, one is struck with the simplicity and unity of design, and the compact and solid appearance of skilful and workman-like execution.

The other, is the New Monongahela Suspension Bridge at the same city, constructed by the same gentleman—who will soon have it open for travel. This work, when entirely completed, will present a most magnificent appearance. It will truly be an ornament to the city and a noble triumph of art, for which the contractor justly feels, and should be proud. It spans the whole width of the beautiful Monongahela River on eight arches of 1500 feet aggregate length. The superstructure is supported by two strong wire cables, which are swung between the road-way and the side-walks: and these are suspended by means of *pendulums* affixed to cast iron columns of a beautiful pattern, which rest upon the stone piers. This work is believed to be the longest in the world—and in point of beauty, workmanship and strength, may well compare, if not exceed, any similar Bridge that has yet been built.

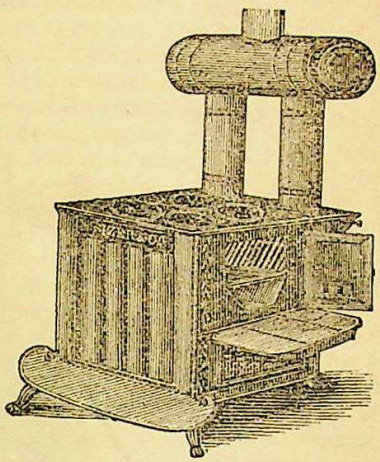
It may be of interest here to state, that the cost of building the Suspension Aqueduct Bridge of 1150 feet length, was $63,000; and the contract price for the new Monongahela Suspension Bridge, of 1500 feet in length, is but $53,000. Thus showing a great economy in the building of these Bridges, when compared with the cost of the old mode of construction, or even similar structures, both in our country and in Europe. As regards strength, it would seem conclusive proof of their capacity, from the fact that the Aqueduct, during the season of 1845, had more than one-fourth more water in the trunk than was necessary or designed for its navigation; and this great excess of weight was safely borne without the least show of increase in the tension of the cables, or the slighest deflexure of the wooden trunk. This statement may be deemed too partial, yet it is with no invidious feelings, but a warm desire, honestly expressed, for both the public and private good, that it may lead to enquiry, and a close inspection and comparison of both these bridges, with others of similar construction, on the part of any company or individuals that may contemplate the erection of like works, as relates to their strength, durability and economy of construction.

We consider this article due to the credit of the City of Pittsburgh, and particularly to Mr. Roebling, who has made very important improvements in the construction of Wire Suspension Bridges—and who is the same gentleman who so successfully introduced *Wire Ropes*, in place of those of hemp, on the Planes of the Portage Rail Road, and other public works.

ARISTIDES.

Pittsburgh, January 7th, 1846.

SIZER'S JUSTLY CELEBRATED DOUBLE OVEN AIR TIGHT COOKING STOVE, FOR WOOD OR COAL.



Which for its peculiar advantages for all purposes of Cooking, simplicity of arrangement, and beauty of mechanical execution, have never been exceeded.

Its economy in the use of fuel is self evident to the most casual observer, bringing every boiler in immediate contact with the fire at all times whether baking or otherwise. It has a large Oven of Cast Iron, around which the fire passes entirely; thus giving an equal weight of heat on all sides. It is also arranged so as to connect with it a sheet Iron Elevated Oven when more heat is required, or a greater amount of work to be accomplished, thus making a complete and perfect Stove for Summer or Winter use. It also admits a Roaster of the largest capacity, covering the entire front; also, a tin Baker upon the top if required. Thus arranged, it is capable of accomplishing a greater amount of Baking, Boiling, and Roasting, than any other Stove of the same dimensions, and an equal amount of fuel.

It is also equally as well adapted for coal as wood, being constructed on the air tight principle, the heat may be retained a much longer period than in the common stove, thus diminishing the consumption of fuel nearly one half.—*Springfield, Massachusetts.*

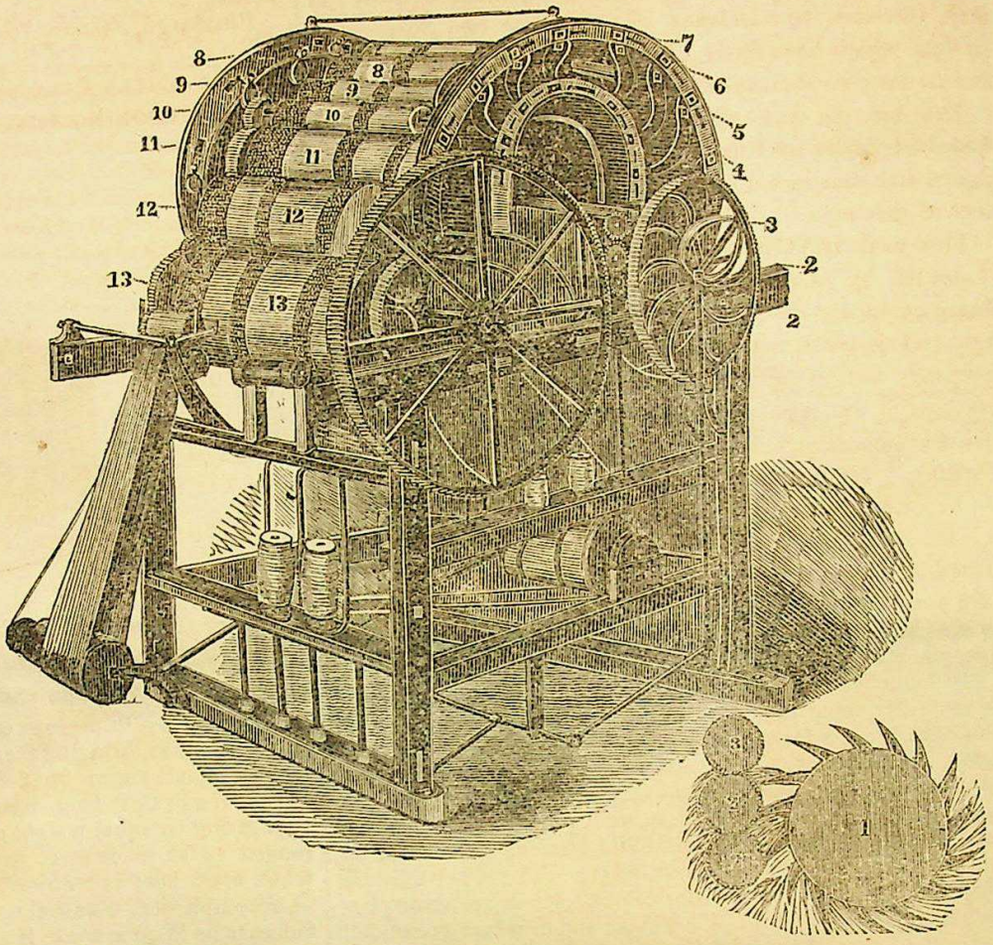
A letter from Stockholm states that the Swedish Government has adopted the proposition of a company of English capitalists for the construction of railways. It is added that on April 1, these works are to be commenced, and 6,000 men employed. The first lines are to run from the capital to Gefle, Wesheraes, and Nykoeping.

The atmosphere principle is every day gaining ground. It is now admitted, though reluctantly, by those who were its enemies, to be a new instrument of power, by means of which many important objects may be achieved. The trials on the Croyden line continue to give the most perfect satisfaction, and though it may not entirely supersede the power of traction now in use, we are persuaded it will enhance the value and extend the usefulness of railway communication.

☞ Arkwright, the inventor of the cotton spinning machine, whose father shaved men for a penny a piece, in London, acquired a fortune which yielded an income of £450,000 a year, and left, at his death, a fortune of £10,000,000—nearly fifty millions of dollars.—*Phil. Chron. Jan. 6.*

CHASE'S CARD SPINNER,

For carding and spinning Wool around Cotton or other yarn, patented by Moses Chase, and owned by George Law of Baltimore, Maryland.



This Machine cards the Wool and spins it around a Cotton thread, and by this combination, produces a yarn for the Manufacture of Linsey Woolsey, Stockings, Capots, Blanketing, Carpeting and other fabrics for Domestic purposes, of superior strength, warmth and durability.

It is both simple and durable in its construction, being composed principally of Iron, not liable to be affected by the sudden changes of the atmosphere, and in conjunction with the Cotton Spinning Jenney, now in extensive use on Southern Plantations, for spinning the refuse Cotton into Yarn and with a common Loom, the Card Spinner will enable the Planter to be his own manufacturer; or by purchasing the coarsest kind of Cotton Yarn, where the Planter has not the facility of spinning his refuse Cotton, he can, with Wool of his own growing, and the attendance of two Boys or grown Hands, *who from age or other causes, may be incapable of field labor,* spin with two Spindles, sufficient yarn, to weave from six to eight yards of yard wide Cloth per day.

The properties of this Machine have been so thoroughly and satisfactorily tested before offering it to the Public, that the Proprietor now feels confident, that it will prove an invaluable acquisition to the Planter and Farmer, desirous to make his own Clothing.

CHASE'S CARD SPINNER, consists of thirteen Card Cylinders, which are numbered in the above Plate, to correspond with similar numbers, marked on each Cylinder of the machine itself, as follows:

No. 1, The Feed Comb,
" 2, " 2, Two Feeders,
" 3, The Feed Stripper,
" 4 & 5, Workers,
" 6, Stripper,
" 7 & 8, Workers,
" 9, Stripper,
" 10, Worker,
" 11, Main Cylinder,
" 12, Fancy,
" 13, Doffer.

} As represented in Plate *(detached.)*

So that in case of accident to any of the above Cylinders, requiring them to be renewed at any time hereafter, this can be done without danger of mistake, by sending the number, which corresponds with a similar number marked on each Cylinder of the machine itself.

TO FEED AND WORK CHASE'S CARD SPINNER. The Wool should be well washed and thoroughly divested of all burs and sticks, and then applied by hand to the wire teeth of the Feed Comb (No. 1,) by drawing the Wool over the points of the teeth, till said Comb (No. 1,) is full of Wool for carding.

Each revolution of the Feed Comb (No. 1,) will cause the Bell on Machine, to ring, when the Carded Wool must be taken from the Lap Belt, and applied to the guide on the spinning part of the Machine.

The Carded Wool thus applied, will be taken from the Doffer (No. 13,) by the delivering rollers, and twisted around the Cotton Yarn by the Flyers, giving it all the appearance and properties of the best Woollen Yarn, *with the advantage over Yarn made of Wool alone,* that this new Yarn possesses greater strength and durability, by its combination of Wool and Cotton.

Spools containing the Cotton Yarn adjusted for spinning and covering it with the Carded Wool, will be fixed on each Machine in working order, and exhibit the combination by which the Carded Wool is twisted around the Cotton Yarn, and thereby a great saving of Wool is made in the filling.

To change the Spools, when full, watch when the travers is down at its lowest point, as the proper time for doing this.

TO SET CHASE'S CARD SPINNER, it is necessary for all the Cylinders to come nearly in contact with each other, *without touching*, except the Fancy Cylinder (No. 12,) which must act as a brush, by touching the main Cylinder (No. 11,) just enough to be heard by placing the ear near it.

When the Machine is in motion, it is necessary to be particular to keep the other Cards from touching each other, as they would soon cause the machine to be so dull, as not to card well.

It is, also, necessary to keep the Journals of the Machine well oiled, and particularly the Fancy Cylinder (No. 11,) the Spindles and Spindle Drum.

When the Machine becomes so dirty, from the accumulation of grease and dirt, as to present a glossy appearance, it will be necessary to clean it with a common wool or cotton Card, by drawing it in the direction of, or with the teeth upon the Cylinders, taking care not to beat or knock down the teeth.

CHASE'S CARD SPINNER.

Of all the improvements and inventions of modern times, there is, perhaps, none of more importance to the Southern Planter and Northern Manufacturer, than this invention of Mr. Chase's. It is intended for the fabrication of an entirely new article, by enveloping a cotton thread in a woollen fibre, making a thread of four times the strength of one of the same diameter all wool, and will entwine from one to four threads of cotton (twisting them into one thread) with wool, on each spindle. The goods manufactured of this material, possess all the warmth of woollen cloth, with double the durability, and in consequence of the principal material used, (cotton) being so much cheaper than wool, they can be made at a far less cost, than an article composed entirely of wool.

The machine is very simple in its construction, and being made principally of cast iron, will only require a renewal of the cards, occasionally, to last for ages. At one operation, it cards the wool and envelopes the cotton yarn in a woolen integument, strongly entwined around it, in larger or smaller quantities, according to the species of goods intended to be made, at the wish of the operator, preparing the yarn for the manufacture of a substitute for all woollen goods, from a light flannel to a heavy blanket.

Mr. Law of Baltimore, is engaged in the manufacture of these machines, and has several two-spindle machines finished, and ready to deliver. These machines are intended for the use of Planters, and with two superanuated negroes or hands, not strong enough for field work, will prepare material enough, in one day, for 8 yards of ¾ cloth.

Mr. Law is, also, engaged in the manufacture of large machines to be employed in manufactories. He has one in operation, with 26 spindles, which is capable of preparing one hundred and fifty pounds of the material daily. The number of spindles may be increased to any desirable extent.

The small machines have been fairly tested by three years trial in the South, by one of its largest Planters, and its merits fully acknowledged.

For our explanation of the machine, see the annexed engraving.

Since writing the above, we have received the following letter, from Mr. Law, detailing other advantages of his machine.

Baltimore, February 11th, 1846.

DEAR SIR:

I crave reference to my letter, by the 9 o'clock Cars of this morning, with some remarks relative to the construction of the two Machines. The two spindle one for Plantation use, and the 26 spindle one for Factory use, and as respects the latter, I then made a material omission in not noticing the great gain or saving there is in the Card Spinner, not requiring any mule or jack, which, as I understood your brother was dispensing with a costly machine, hitherto required in the spinning of woollen yarn, and the saving of the room of an entire floor, required in a woollen factory for these extra machines, dispensed with, in the spinning of wool around a cotton yarn, besides a saving of at least 50 per cent of cotton in the filling. Say, the difference between 28 cents per lb. paid for wool, and 14 cents per lb. paid for the cotton yarn, around which the wool is twisted, instead of the whole filling being of wool, at 28 cents, and the new combination of wool with cotton, forms a stronger and better yarn, than the yarn made of wool alone. It would be well to note these matters, and, also, what Mr. Chase has reiterated to me, since I wrote to you this morning, that the 26 spindle machine will certainly spin more than 100 lbs. of yarn, per day, and he would not be surprised to see it spin as high as 150 lbs. of yarn, per day.

GEORGE LAW.

TO PETER H. BROWN.

Washington, February 25th, 1846.

SIR:—I have witnessed the operation of Chase's Patent Card Spinner, for enveloping Cotton, Hemp or Flax with wool, and I am convinced, that the Machine will give a thread, much stronger than one made with wool, in the ordinary way, and equally as warm, without showing anything else, than the wool. The fabrics, I have seen, are, I would suppose, stronger than all wool, and as strong as cotton, possessing the warmth of one, with the durability of the other.

I should suppose, such a Machine could be introduced to great advantage in private families, in the South, and can be operated easily by two very ordinary hands.

DIXON H. LEWIS.

PETER H. BROWN, ESQ.

CHASE'S CARD SPINNERS.

This ingenious machine, which we have called the attention of our readers to, in the articles above, has, since we prepared that article, been exhibited in the Capitol here, together with specimens of various fabrics, manufactured from the material, prepared by the machine, viz. Blanketing, fulled cloth for field hands, or hands engaged in laborious occupations, and flannels, linseys and stocking yarn. The warmth and strength of those specimens attracted the attention, and elicited the commendation of all who examined them. And they were astonished, when the novel combination, by which these articles were produced, was explained, acknowledging at once the superiority of these articles, to goods of the same apparent quality manufactured of cotton and wool or all wool in the old way.

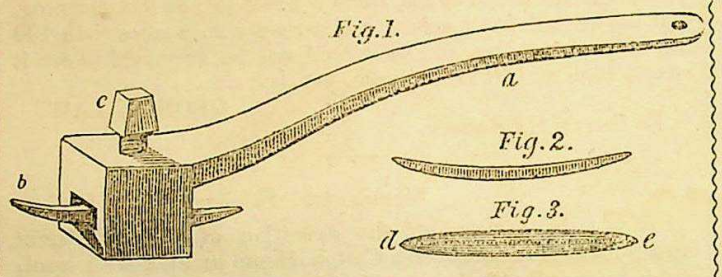
A specimen of belting was also exhibited, made by using a thread prepared by this machine of four threads of cotton doubled and twisted, and enveloped in wool, for both warp and filling. This belting is used for bands or straps to drive Gins or other heavy machinery and is said by those who have used it to be far superior to leather straps, which are generally used for such purposes, in every

respect. When once drawn tight, they are not liable to stretch, they never become smooth and slip as leather straps frequently do, and they are far more durable.

The principle and the mode of combination was ocularly demonstrated by a family machine in full operation in the same department, the simplicity and ingenuity of its mechanism, the ease, facility, and rapidity with which it executed its functions, the little labor required to produce the effect, and the perfect manner in which it performed its operation, satisfied all who saw it, that the machine, was one of the most valuable improvements of the present day.

It was visited by many members of both Houses of Congress. Who considered the novelty of its invention only equalled, by its importance to the Country, which would from the cheapness and excellence of the fabrics produced through its agency, enable this country to set foreign competition at defiance.

"EDITOR."



LETTERS PATENT, DATED 26th AUGUST, 1845.

CHARLES ARTHUR, *Keesville, New York*

The schedule referred to in these Letters Patent and making a part of the same:

Be it known, that I, Charles Arthur of Keesville, in the town of Ausable, in the County of Clinton, and State of New York, have invented a useful tool for turning off and scraping Grind Stones used in nail factories for grinding dies; also for turning off and making true the sides and periphery of Grind Stones for any and all uses, and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawing making a part of this specification, in which figure 1 is a perspective view, *a* the handle or holder of the turning tool, *b* the turning tool, which is simply a plate of elastic Steel, having a *spring temper*, say of from three to five inches in length, from two eighths to six eighths of an inch wide, and one sixteenth of an inch thick, through the middle lengthwise, and made strictly thinner towards each edge, the *width* to be adapted to the kind of turning off, of the Stone intended to be accomplished, it being understood, that the ends of the turning tool are to be either oval or straight, or such other shape as may be desired to form the required surface to the periphery of the Grind Stones. The tool should be so held when turning as to point to the axle of the Stone, making always a proper allowance for the spring of the tool. The elastic turning tool *b* passes through a thin opening or socket in the end of the holder *a*, and is secured by the set screw *c*, say three-eighths of an inch in diameter and one inch long, with a half inch square head, passing perpendicularly through the centre of the upper half of the socket part of the holder, by means of which the turnieg tool *b*, is confined in its proper place and position, and the degree of its elasticity regulated by the greater or less proportion of the same outside of the socket.

What I do claim as my invention, and desire to secure by Letters Patent is, the employment of an elastic metal tool for cutting and turning off and shaping the periphery or sides of Grind Stones, as above described, in any form or manner substantially as herein described, in which an elastic metal tool may be applied to that use.

[See Plate 1, Figures 6 and 7.]

LETTERS PATENT DATED NOVEMBER 8TH, 1845.

DAVID B. ROGERS, *Stafford, New York.*

To all whom these presents shall come, be it known, that I, David B. Rogers, of Stafford, in the County of Gennessee, and State of New York, have invented a new and useful improvement, in machinery for cutting and forming the teeth of Cultivators, and other similar purposes, and I do hereby declare, that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of said specification, of which figures 1, is an isometrical view, figure 2, is a top view of the same.

The nature of my invention consists in constructing a machine with a shear for cutting into shape the tooth from thin plate steel, and swedging said teeth into form at one operation, which in the manufacture requires only one heat for the whole operation.

To construct my machine, a concave die (a) is formed to shape the outside of theto oth in, this die is affixed to a steel piece (b) of horse shoe form, which forms one of the shear blades for cutting the shape of the toe of the tooth. This shear can be attached to the die by set screws, so as to set it up to the other blades about to be described; jointed to the frame on which the die (a) rests, there is a lever (c,) the end of which comes directly over the die, being formed into a counter die (d,) the front end being rounded in the exact form of the tooth to be made. Around this curved part there is affixed a shear blade (e) that cuts in connexion with the blade (b) the toe of the tooth as it descends; which at the same time the counter die is forming it into proper shape. The last described blade only extends out to the widest part of the counter die, which is far enough to cut off the plate of steel used in the manufacture. The front part of the upper blade at the centre of the curve, is longer than at any other point, cutting from the centre towards each edge, so that the toe of the tooth as it is cut, is gradually bent down into form, and the iron plate is firmly held in a proper position to be acted on.

Having thus fully described my improvement,—what I claim therein as new and desire to secure by letters patent is the combination of the cutter or shears projecting down in the centre so as to commence cutting in the middle of the plate with the die forming the teeth of the Cultivators, substantially in the manner and for the purposes set forth.

[See Plate 1, Figures 4 and 5.]

LETTERS PATENT DATED NOVEMBER 26TH, 1845.

R. F. LOPER *of Philadelphia, Pennsylvania.*

The schedule referred to in these letters patent and making part of the same.

To all whom these presents shall come: Be it known, that I, R. F. Loper of the City and County of Philadelphia, and State of Pennsylvania, have invented a new and useful improvement in the mode of drawing up and letting down, the spiral or screw propeller of Steam Ships, or that class of propellers generally known under the appellation of the Loper, the Ericson, the Archimedes, and all others having oblique or curved paddles attached to a shaft, the axis of which is in the line of the ship's keel, or nearly so, and that the following is a full, clear and exact description, of the principle or character thereof, which distinguishes it from all other things before known; and of the manner of making, constructing and using the same, reference being had to the accompanying drawings, making part of this specification, in which figure 1, is a perspective view of the propeller and apparatus for raising and depressing the same as applied to a ship; and figure 2 a longitudinal vertical section of the same. The same letters indicate like parts in all the figure.

The importance of steam as an auxillary propelling force to wind, has for several years been urged upon the attention of the public, in this Country and Europe, with so much zeal and ability, and was so obvious, that at last the whole maritime and engineering would admit that the success of the application of steam to transatlantic navigation and the military marine depend upon the success of some plan for the application of steam as an auxiliary defence. To attain this end it is conceded by all that the propeller must be so arranged, as to admit of being drawn up from the water, that no obstruction may be presented to the sailing of the vessel, during the prevalence of fair winds; but this has heretofore presented many (and in the minds of some insurmountable) difficulties, on the account of the exposed condition of the propeller to the action of the waves, which are always prevalent, at the time the propeller is to be drawn up or let down; particularly as the propeller must be coupled with, and uncoupled from the shaft during the action of the waves. Many attempts have been made to attain this desirable end, by hanging the propeller in a frame, adapted to slides, in the sides of the opening cut out of the dead wood, or run of the vessel in which the propeller worked said frames to be suspended by chains to the draw of a windlass on the deck of a vessel, this however is only effective in drawing up the propeller; but it fails in letting it down, for the frame will almost invariably join (as it is technically termed,) when slashed by the wave in descending, as it is impossible to make the slides, sufficiently true and light to prevent amount of play, necessary to prevent jamming; for the metal frame is not only liable to rust from the action of the salt waters; but to be bent by the swell of the wood of the vessel, which will impede the descent of the frame, and therefore, it is necessary that full play be given to the sliding frame in the slides, and this indispensable play brings about the difficulty of jamming, and renders it almost impossible to insert the shaft in the heel of the propeller. All of these evils I have encountered in my experience, and, I at first attempted to surmount them by attaching two screws to the top of the propeller frame and passing them up through screw nuts on the deck; but this, I was forced to abandon, in consequence of the projection of these screws to a considerable height above the deck at the very time, that a free deck is required for the management of the sails of the vessel, viz: during the prevalence of winds at which time the propeller must be drawn up. All these difficulties have led me to the invention of the improvement, which I desire to secure by letters patent; and which consists in attaching two screws to cog wheels on the deck of the vessel, which mash into a large cog wheel, on the drum of a capstan, the threads of the screw taking into nuts, formed into the sliding frame of the propeller, the sides of which frame are bored out cylindrically to a certain depth to admit the screws to pass therein, and to protect them from the action of salt water deposites and rust which would prevent their working.

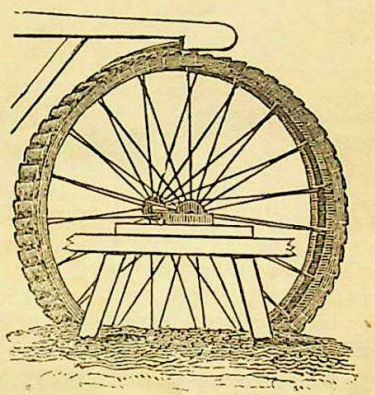
In the accompanying drawings (A) represents a propeller, for which I have obtained letters patent, on a shaft (a) having its bearings in the lower ends of the side pieces (b b,) of a sliding frame, the end of this shaft is clear, to admit of the locking and unlocking of the sliding main shaft (c.) The frame in which the propeller is hung has tongues (d d,) on its side to slide in grooves made in a metallic frame (e,) inserted in a hole in the run or dead wood of the vessel, and when let down rests on shoulders (f f,) projecting from the sides of the frames (a.)

The sides (b b) of the propeller frame are bored out and tapped for the reception of two vertical screws (g g,) each having a cog wheel (h h,) attached to the upper ends to take into a cog wheel (i) on the lower end of a capstan (k,) by which the two screws are turned simultaneously, and in the same direction to force down or draw up the propeller, the screw shafts having journals near their upper ends, working in boxes (b b) in the plate (m,) which hold the spindle (n) of the capstan (k.)

By means of this arrangement it will be obvious that the turning of the screws by means of the capstan will cause the propeller frame to slide up and down by a positive motion without the possibility of the frame jamming in the slides, and will carry it down steadily, and present the hole in the shaft in such manner as to admit of coupling it, and the crank shaft together, without any danger of accident, whilst at the same time the sides of the propeller frame effectually shield the screws from such action of the salt water as would render them useless.

What I claim as my invention, and desire to secure by letters patent, is combining the elevating screws with the frame of the propeller by means of opening therein, to receive the same so constructed as to entirely exclude the surrounding water from that part of the screws, which is within the frame, the whole being constructed and arranged substantially as herein set forth.

PAGE'S IRON SUSPENSION WATER WHEEL.



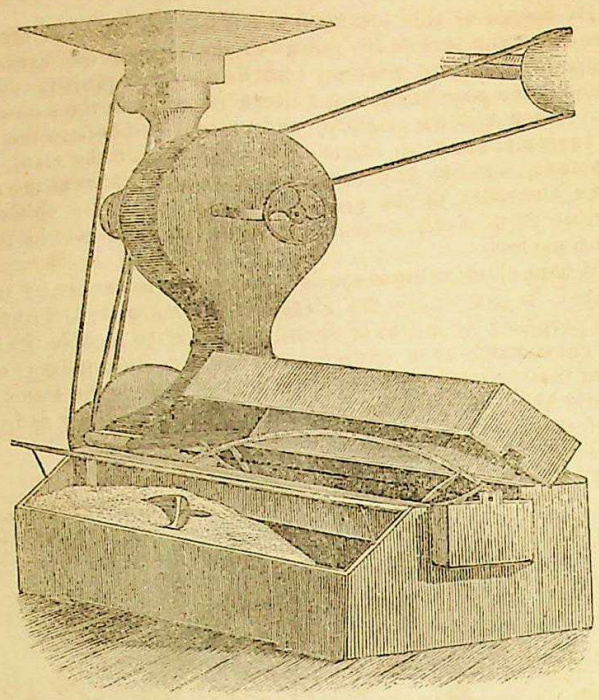
This invention promises to be of greater utility than any thing of the kind that has ever been offered to the world before.

The wheel may be made entirely of Iron, the arrangement of the gearing being such, that the expense of putting a mill in operation with this wheel is nearly or quite one half less than the old plan, the power is more directly applied to the machinery, and the expense and trouble of the large cog wheel and trundle heads are entirely dispensed with. Its other advantages are, that it is more durable than the common wooden wheel and requires less repair, it revolves with much more correctness and regularity, each part of the circumference being of equal weight and maintained by suspension rods at an equal distance from the centre, it can never become water logged as the old wheel, one side becoming heavier than the other, producing a consequent irregularity in motion.

They will evidently become in general use, and the builders of mills and other machinery are advised to use them as being much more economical, and a great saving of time and expense. The inventor has put one up on silver Spring farm, for F. P. Blair, Esq., near Washington city, of twenty-five feet diameter, which has been in constant operation since August 1844, and has never been required to stop a moment for want of repairs in any part of the machinery: this wheel the public are respectfully invited to inspect.

GEORGE PAGE, Machinist.

PAGE'S GRIST MILL.



These Mills are simple in construction, not liable to get out of order and easily repaired. With a power of 4 horses they will grind 4 bushels of beautiful meal an hour. The advantage of such a convenience on a large estate, or in a neighborhood where there may be no custom-work mills, need not be dwelt upon, it being too obvious to need comment.

Price with 2½ feet cologne stones, $125; bolt $15; with 3 feet stones, $175; bolt to suit, $25.

☞The Corn Crusher and Grist Mill can be so arranged as that the same power will propel both, thereby effecting an important saving.

Since the above mill was presented to the public, four years ago, the inventor has improved upon it to such an extent, that he can now safely defy competition with any other mill that has ever been offered; his improvements consist in an arrangement by which the mill is fed, agreeable to a quick or slow motion that may be given,—by which the stones are supplied with a regularity never before known. He has also improved upon a plan of cutting or furrowing the face of the mill stone by which the rapidity of grinding is much increased, and capable of grinding much finer meal if necessary, and by changing the Bolt, good superfine flour can be made for family use.

GEORGE PAGE, Machinist.

A new War Instrument.—A Mr. McDowling, manufacturer of Surveyors' and Nautical Instruments, at Newark, New Jersey, has, according to the Eagle, invented a very formidable missile, to be used in war, for the destruction of vessels, armies, &c. It consists of a combustible *dart and ball*, to be thrown together or separate.—It may be so constructed as to suit the bore of a cannon or musket, and can be discharged from either or thrown by the hand. When the dart strikes an object, both explode, causing destruction in every direction. It may be made sufficiently powerful to destroy a vessel of war at the distance of two miles.

PATENTS ISSUED IN DECEMBER, 1845.

Erasmus W. Elsworth, *East Windsor, Connecticut, Improvement in Water Rams.*

What I claim as my Invention, and desire to secure by Letters Patent, consists in a peculiar manner of working the Water Ram, in combination with the Syphon by the use of a chamber of rarefied air for the purpose of causing the escape water to flow down the longer leg of the Syphon in a continuous stream; also in the use of channels in the packing of the joints supplied with water from the air vessel of the Ram, for the purpose of excluding completely and with certainty, the external air from the Syphon; also in the fixtures herein described for setting in motion and regulating the quantity of water consumed by the Ram.

Jacob Magoun, *East Cambridge, Massachusetts, Improvement in pressing Glass Moulds, December 6th*, 1845.

Claims "Having thus explained my invention, I shall claim the plate as combined with the sliding frame for the purpose of receiving the cap plate of any Mould of various Moulds, as described.

C. L. H. Webb, *Lockport, New York, Improvement in the portable Grate, or Furnace for Cooking and other purposes, December 6th*, 1845.

Claim.—"I claim the quadrangular invented pyramid form of the Grate, in combination with the side door hinged at the bottom, and opening downwards to answer the purpose of hearths, that the whole surface of the fire at the sides may be presented and the rays therefrom may be cast on to, instead of over the articles to be cooked, or heated on the hearths, as herein described. And finally, I claim the method of sustaining the side doors when open by means of the pointed and sliding links, as herein described."

Thomas D. Burrell, *Genoa, New York, Improvement in Corn Shellers, December 6th*, 1845.

Claim.—"In the machine described I claim making the *concave plate, or disk* with a concave face and circular opening provided with a lower and upper lip for the discharge of the cobs, in combination with the sheller, and with the shell or bottom, and also with the door or valve in the side for broken cobs, &c.; and also the cylindrical *hopper and spring in combination with the feeder*, all as herein described."

Samuel Pierce, *Peekskill, New York, Improvement in Cooking Stove, December 9th*, 1845.

Claim.—"I claim the arrangement of the parts by which I supply the fire with heated air; said arrangement consisting mainly of the sliding registers, and the plate in front of which the air must descend on its passage to the grate bars. The heating of the admitted air has been attempted under other arrangements, and I limit my claim therefore, to the special combination of parts by which I attain this end."

Allen Eldred, *Oppenhein, New York, Improvement in Cullivators, December 10th*, 1845.

Claim.—"What I claim as my invention is, joining the sockets, that receive the standards of the ploughs, to the frame as herein described, to admit of adjusting in a vertical, as well as horizontal direction, as specified; and finally, I claim the method of adjusting the front double took by means of the enlarged mortice and wedges, in combination with the journal projections of the standards, as described."

Ebenezer Barrows, *City of New York, Improvement in Air heating Furnaces, December 11th*, 1845.

Claim.—"What I claim as new therein, (the air heating Furnace,) is combining with such a furnace the evaporating and radiating vessels, or vessel arranged, combined, and operating substantially in the manner and for the purpose herein made known."

Theodore Ely, *City of New York, Improvements in the machine for ginning Cotton, December 11th*, 1845.

Claim.—"What I claim as my invention, is making the ends of the fluted, grooved or ridged ginning rollers, without the flutes, grooves, or ridges, so that they shall run on each other, and thus prevent the injurious action of their parts operating on each other and the fibres of the Cotton as described. I claim the rotating stripping or cleaning rollers in combination with the ginning rollers, for the purpose and in the manner substantially as herein described. I also claim the feeding roller, and beat or blower in combination with the ginning roller, for the purpose of loosening the Cotton, and presenting it to the action of the ginning rollers as described. And finally, I claim the beater or blower in combination with the ginning rollers, for the purpose and in the manner described."

Walter Hunt, *(Assignor to George Arrowsmith,) City of New York, Improvement in Ink-stands, December 11th*, 1845.

Claim.—"My claims in the above described invention, are confined to the filter tube in combination with the funnel, plunger, spring, sponge, and perforated bottom, arranged substantially in the manner, and for the purpose, herein above described."

HENRY KATISSOWSKI & F. P. WIERZBICKI, *City of New York, Improvements in the construction of Stoves and Grates, December 11th*, 1845.

Claim.—"We do not claim the use of a radiator, or radiators like those marked B as new, such having been before used, but we limit our claim to that arrangement of them, by which they are made to heat an ascending current of air on each of their sides, for the purpose herein fully made known. We do not intend, however, by this claim to limit ourselves to the particular form of either of the parts of the said apparatus, but to vary these as we may think proper, whilst we attain the same ends by an arrangement of parts substantially the same."

SAMUEL S. WALLY, *Charlestown, Pennsylvania, Improvement in manner of combining a Canal and Rail Road for the transportation of goods, December 11th*, 1845.

Claim.—"Having thus fully described the manner in which I combine the Rail way and Canal for the purpose of transportation,, what I claim therein as new, is the combining of a Rail Road and Canal, by laying rails on the bottom of the Canal, which is to be used, and submerged with its contents of water, by the employment of a locomotive Engine and of Car boats, which, whilst their wheels are sustained upon the rails, are to be buoyed upon the water as set forth.

I claim the adopting of the Car boats and the lock chamber to each other, so that when the former are contained within the latter, they shall operate as lock gates by preventing the passage of water, thereby allowing the lock gates to be opened, and the train to pass through the lock with little loss of water, upon the principle, and substantially in the manner herein desribed."

JAMES MAULL, *Philadelphia, Pennsylvania, Improvements in making Sails for Vessels, December 11th*, 1845.

Claim.—"What I claim as my invention, is cutting and making the Sails of all kinds of Vessels with the warp of the cloth and the seams in a horizontal direction for the purpose and in the manner described."

FRANCIS DUPLESSIS, *Plaquemines, Louisiana, Improvements in Sugar Boilers, December 11th*, 1835.

Claim.—"What I claim as my invention is, the arrangement of a series of kettles for evaporating sacharine juices and syrups in the manufacture of Sugar, on the top of and let into one steam Boiler, when any method is employed of regulating the temperature of the kettles, that is reducing or increasing the temperature of a portion of the series without affecting the rest, substantially as herein described.

I also claim arranging the series of evaporating kettles, let into the top of one steam boiler to have them exposed directly to the action of steam within the boiler, in combination with the arrangement for the pans, for preparing the saccharine juice, by means of steam conducted from the boiler into the double bottoms of the pans, as herein described. And I also claim dividing the boiler into two or more compartments by a partition, or partitions, provided with a valve, in combination with the arrangement of kettles let into the boiler, for the purpose of regulating the temperature, as herein described."

A. S. PELTON, *Clinton, Connecticut, Improvement in the mode of operating weather strips for doors, December 16th*, 1845.

Claim.—"What I claim as new is the particular manner in which I have combined the respective parts as herein described, that is to say, the water table being forced down by the action of the head by the rod on the inclined plane through the introduction of levers, and being raised by the spiral springs when the door is opened, and the necessary adjustments being also effected by the aid of screw nuts and spiral springs, substantially in the manner described."

JOHN ALLEN, *Cincinnati, Ohio, Improvement in the method or process of restoring the natural feelings of the face in cases where the cheeks have fallen in, December 16th*, 1845.

Claim.—"What I claim as my invention is the manner of restoring hollow cheeks to their natural contour and rotundity, by means of metallic bulbs, formed, fitted to, and secured in the mouth substantially in the manner set forth, or by any other similar attachment secured between the jaw bones and the cheeks."

HARVEY MOORE, *Residence North Carolina, Improvement in manufacturing Chewing Tobacco into lumps, as it is termed, December 16th*, 1845.

Claim.—"What I claim as new, is the method of forming Tobacco "lumps" by means of the frame and series of blades arranged and formed substantially as herein described in combination with the bed, whereby I save much labor in arranging the Tobacco leaves, &c. And I am enabled to form and press a large number of "lumps" at one operation, to lay the covering smooth and even, give a more perfect form, and discharge them from the moulds in which they are formed with greater facility than by the old method."

W. G. YOUNG, *(Assignor to A. H. Reip,) Baltimore, Maryland, Improvement in Bathing Apparatus, December 16th*, 1845.

Claim.—"What I claim as my improvement is a boiler surrounding the furnace as herein described in combination with a flue ascending and returning in an apartment at the foot of the bath as above set forth."

RICHARD HEMMING, *Boston, Massachusetts, Improvement in Cylindrical Type setting, December 16th*, 1845.

Claim.—"What I claim as my invention is the method of retaining Types in their proper relative positions on a cylindrical bed, by means of rules or strips of metal, or other appropriate substance, fitting into recesses made for that purpose in the body or stem of Types, substantially in the manner described."

ANDREW HOAD, *City of New York, Improvement in Fence gates and Gate ways, December 16th*, 1645.

Claim.—"What I claim as my invention is such a Gate, hung and turning on a centred axis, in combination with the fence arranged around the axis of the Gate and with two carriage, or other ways, on opposite sides, as herein described and for the purpose specified."

ROBERT P. CUNNINGHAM, *Abington, Connecticut, Improvement in Machinery for operating Shuttles in Looms, December 16th*, 1845.

Claim.—"What I claim as my invention, is forming the face of the Shuttle Cams with a depression, as herein described, to permit the picker to be moved back, clear of the Shuttle point, after the Shuttle has been arrested, and before the Shuttle boxes are shifted, as herein described."

WILLIAM BEEBE, *City of New York, Improvements in Apparatus for circulating hot water. December 16th*, 1845.

Claim.—Patentee claims the mode of forming a pipe with perforations or orifices, near the boiler head for the purpose of securing the boiler against accidental injury in the manner and with the effects set forth; Also claims the mode of making and fitting a plug to draw hot water by the bile in combination with the long slat at right angles with the two former for the purpose of maintaining a circulation of hot water in the pipes, or suspending the same at pleasure.

ERNEST MARX, *City of New York, Improvement in Fire Engines, December 20th*, 1845.

Claim.—Patentee claims the mode of applying the rack frame, and lifting shoe, and tooth wheel, to raise hind wheels from the ground, in combination with the action of the blockers, stays, slide, and screw clip, to hold the engine in place of working. And also, the mode described of fitting the arms and the levers, and connecting the same by the crank pin head screw, to receive the brake rods, and convert the hind wheels into fly wheels in combination with the described means of connecting the parts with the working pistons, when used for the purpose herein set forth.

EZRA CORNELL, *Ithica, New York, Improvement in the mode of operating Electro Magnetic Telegraphs, December 20th*, 1845.

Claim.—"What I claim as my invention, is the new and improved mode, above described, of arranging and adjusting metallic wires, or other conductors, to the Electro Magnetic and Galvanic Telegraph instruments, by which instruments at opposite extremities of the same, or of a single main wire, or located at distant points on the same main wire, or a single wire, may be kept in constant readiness for use, in conjunction with a galvanic battery, without the necessity of keeping the galvanic circuit closed, or the battery in action when neither instrument is at work; and by which the battery is put out of action instantly on the ceasing of the motion of the instrument, and in like manner is put into action immediately on commencing the motion of an instrument, and avoiding the disadvantage heretofore experienced in what have been denominated *dependant* circuits in the working of two or more Telegraphic instruments over a single circuit of wire, or of wire and earth conjoined."

CALVIN B. ROGERS, *Saybrook, Connecticut, Improvement in machinery for dressing Combs, December 20th*, 1845.

Claim.—Patentee claims, the manner in which he has arranged the apparatus for carrying the plates between the cylinders; also the manner in which he has arranged the top bed whereby plates varying in thickness are equally scraped, not reducing the thickness of one more than another; also the manner in which he has arranged the chisels for scraping, smoothing, and shaping the plate; also the manner in which he has arranged the box to receive the plates from the top bed, consisting of a spring on the under side of the bed, &c.

JOHN ERICSSON, *City of New York, Improvement in Steam Engines, December 20th*, 1845.

Claim.—Patentee claims as his invention, the connecting the pistons of the two cylinders to cranks placed at right angles in combination with the admitting the steam directly from the boiler into one cylinder only and the working the steam expansively in said cylinder, together with the employing the steam to act simultaneously on both pistons during half the stroke as hereinbefore described by opening a communication alternately and keeping the same open during half the stroke, between the two cylinders whilst at all times a vacuum is kept up during the entire stroke in both cylinders on the opposite sides of each of the pistons to that on which the steam acts.

Also claims, the momentary stoppage of the exhaust pipe of that cylinder which receives the steam directly from the boiler, and the conveying a portion of the steam from that cylinder into a receiver partially filled with tubes through which the feed water is passed on its way to the boiler in the manner herein before described.

JONATHAN BALL, *City of New York, Improvement in rivetting Sheet Iron and other metals into Pipes, Stoves, etc., December 20th*, 1845.

Claim.—"What I claim as my invention is, the mode of holding the rivets in the holes by the use of the Springs in combination with the mandril or other clamps in their construction and application as they are set forth in the accompanying specifications and drawings."

JOHN W. WILSON, *Philadelphia, Pennsylvania, Improvement in Trusses for sustaining the yards of Vessels, December 20th*, 1845.

The principle and invention, which I, *John Wilson* claim, as mine, and which I desire to secure by Letters Patent is the "*relief truss*" attached to the truss hoop, connecting it with the mast, to the arm, connecting it with the lever and the yard, so as to permit the top mast, to be covered and raised any time at pleasure, through the relief truss, without unshipping the yard, or in any wise interfering with its motions, actions, uses, or any of its appurtenances.

DANIEL NEWTON, *Louisville, Kentucky, Improvement in Machine for double seaming Tin Ware, December 20th*, 1845.

What I claim to secure by Letters Patent as my invention, is the turning on a double seam on the bottom of Tin and Copper ware by the application of a level wheel on a shaft placed at right angles with the shaft on which the vessel revolves, in combination with the guide on which the seam rests, in order to induce a perfect rotary motion of the Vessel.

JOHN J. HOOE, *Derby, Connecticut, Improvement in bealing and cleaning Wire, December 25th*, 1845.

I claim as my invention and desire to secure by letters patent, the combination herein described of parts which are herein designated, and marked in the drawings respectively as follows, viz: The block a platform the lifter and the end or pins, and I claim said combination of the block, lifter, and curb, whether in combination with or without the guide.

JAMES MACLEAN *of Philadelphia, Pennsylvania, Improvements in Wick Tubes, for burning Camphine, December 26th*, 1845.

I claim as my invention, and desire to secure by letters patent, the use or substitution of tubes, made of a material, which is a non-conductor of heat, instead of the ordinary metallic tube, between which, the wick works up and down, and also, the protection of the non-conducting tubes by which the cap, or prolongation is metal. I do not claim any particular form of Lamp, but simply, the application of tubes of a non-conducting material, and the protection of such tubes from the effects of the flame of the Lamp. The tubes in question, may be applied to Lamps of every shape and construction, and my claims intend to cover such application.

ALLEN WARD, *Camden, New Jersey, Improvement in Tailors' Measures, December 26th*, 1845.

Having thus fully described the manner, in which, I construct my coat sector, and also, that, in which, it is applied to the marking-out, for cutting a coat. What I claim therein, as new, and desire to secure by letters patent, is the manner, in which, I have arranged and combined the four arms and the neck slide. The respective arms, forming the angles herein designated, or nearly such, and the second and the third arms being made to slide upon each other, for the purpose of enlarging or diminishing the profile of the garment, to be cut; then, also, being on three of those arms, divisions with marks of numbers, corresponding with each other, in their general proportion and arrangement, as represented in the drawing, and herein fully described. I will here remark, that, although, the divisions and numbers marked on the respective arms, are considered, as useful and convenient for despatch, they are not essential, as the measure taken, as herein designated, may be applied to the arm and a mark made upon it, the length of the combined arms may, also, be determined by the same measure, and the neck slide also, be moved thereby, to its proper place, three measures always being about the same.

BENJAMIN S. BENSON, *Harford County, Md., Improvement in Hydraulic Rams, December 25th*, 1845.

What I claim for my invention and desire to secure by letters patent, is the raising spring water to a higher level than its source by the momentum of a running stream, or river, or other water in contact therewith, in a double run constructed as aforesaid, or other run constructed and combined substantially in the manner set forth, by which analogous results are produced; the two raises being united by an additional pipe in which the spring and river water come in contact as above set forth.

I also claim the combinations and arrangements of the lever bucket and valve with the reservoir, as described, for keeping up the action of the machine.

I likewise claim the arrangement of the Springs for insuring the opening of the valve as described.

[TO BE CONTINUED.]

THE MIRROR OF THE PATENT OFFICE.

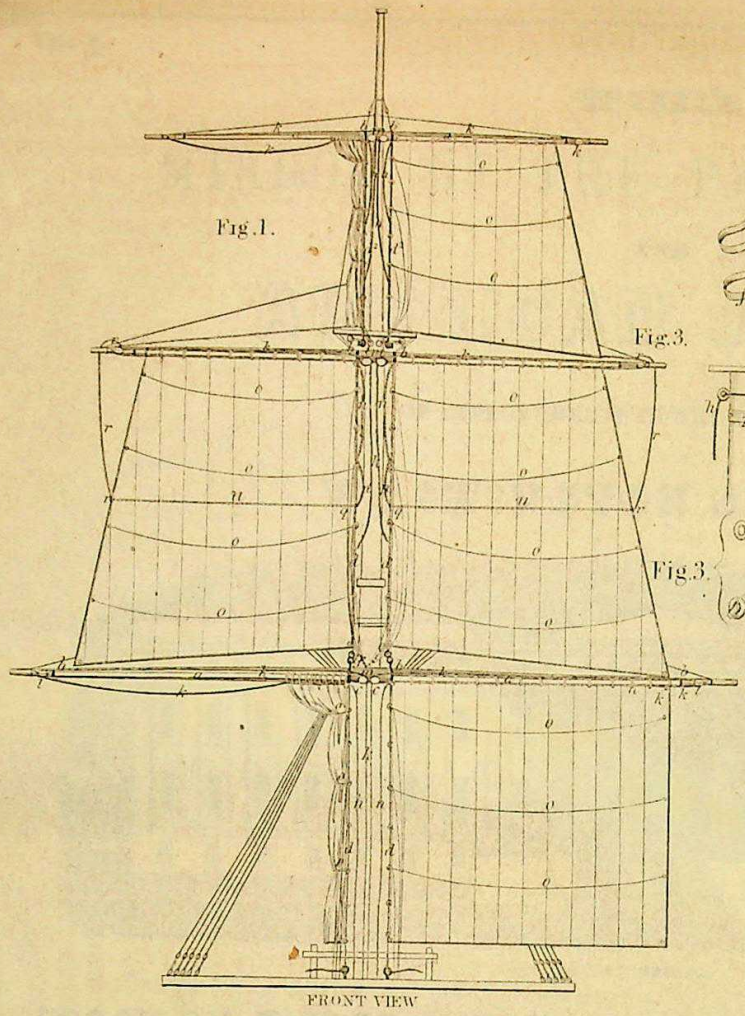
The first number of our paper will not be so interesting to general readers, on account of the large space occupied by the publication of the Patent Laws, and Patent Office regulations. These had necessarily to be published, for the instruction of persons, having business with the Patent Office, and will enable those, not acquainted with the Laws of Patents, and the rules of the Office, to comply with all the requisitions demanded of them, in their transactions with the Patent Office. They have been inserted, as preliminary to the notice of all the improvements made in the Arts and Sciences, in this and foreign countries—to instruct all persons having made improvements, how to avail themselves of the Laws enacted, for the purpose of encouraging the enterprizing and enquiring spirit of our citizens.

The future numbers of our paper will contain all the new inventions, both foreign and domestic, thought to be important to the Mechanical, Agricultural, Manufacturing and Scientific interests of the country.

This has delayed the issuing of the first number; but we will issue the other numbers, so as to overtake our lost time; and have them regularly published, hereafter, on the fifth or sixth of the succeeding month.—EDITOR.

PLATE .1.

Fig.1.



FRONT VIEW

Fig.3.

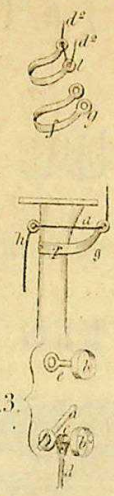
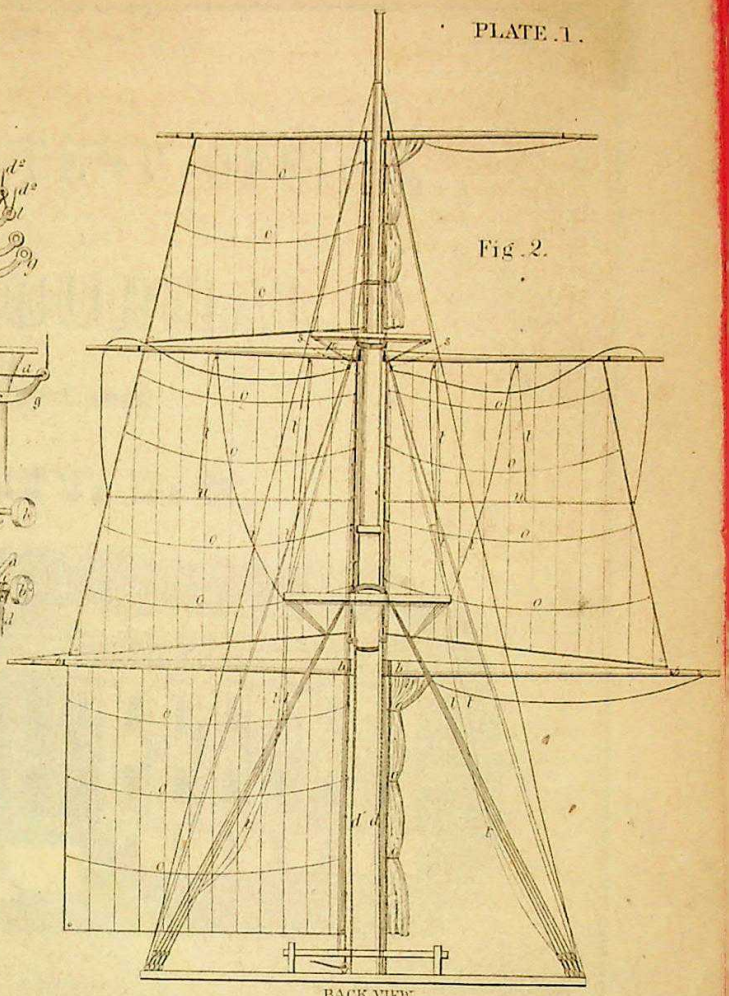


Fig.2.



BACK VIEW

Fig.4.

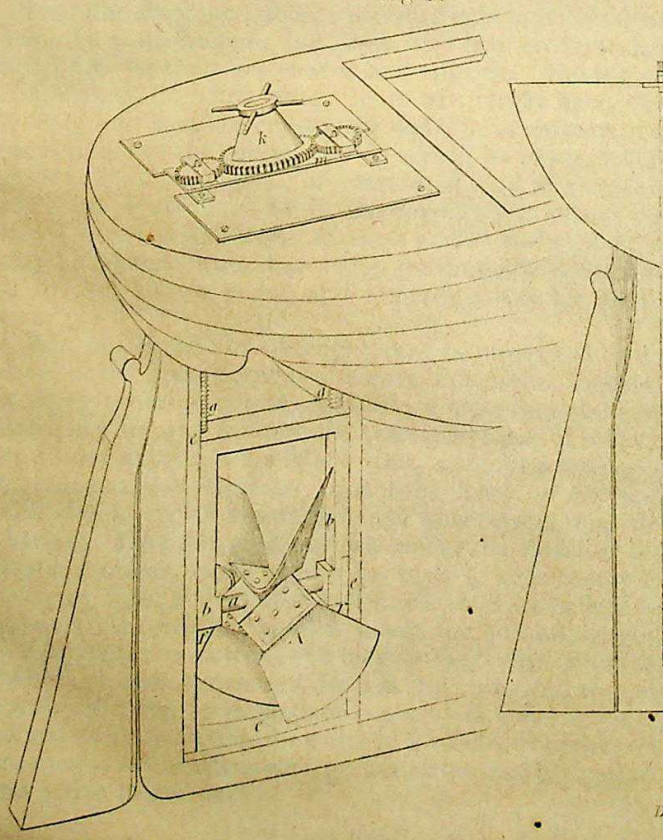


Fig.5.

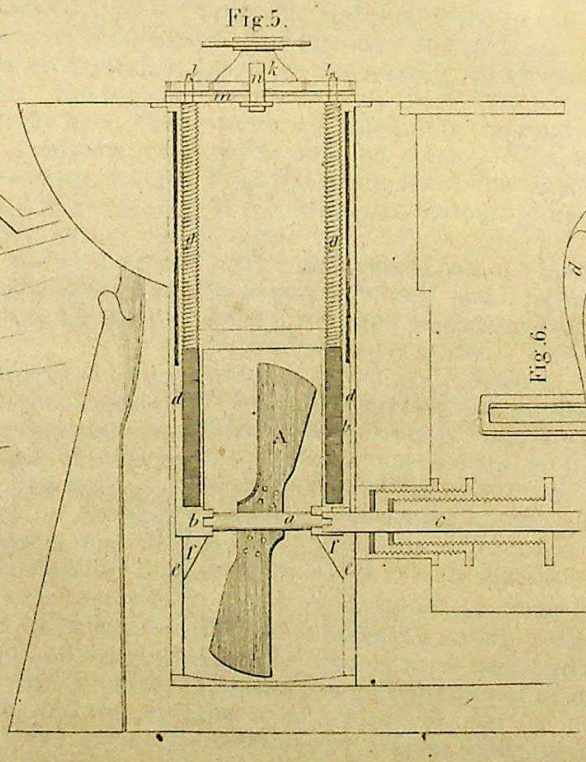


Fig.6.

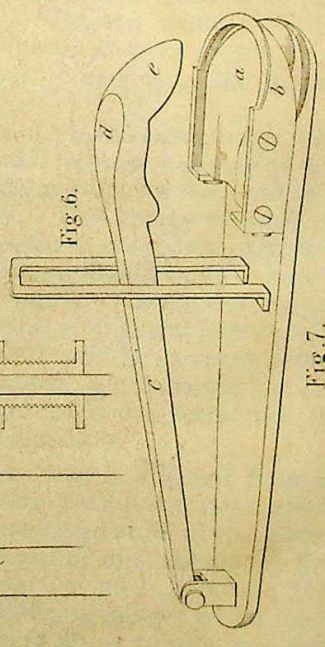
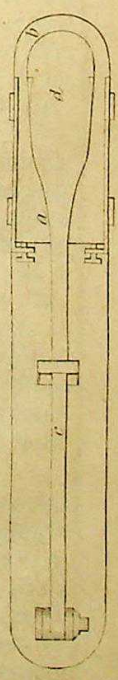


Fig.7.



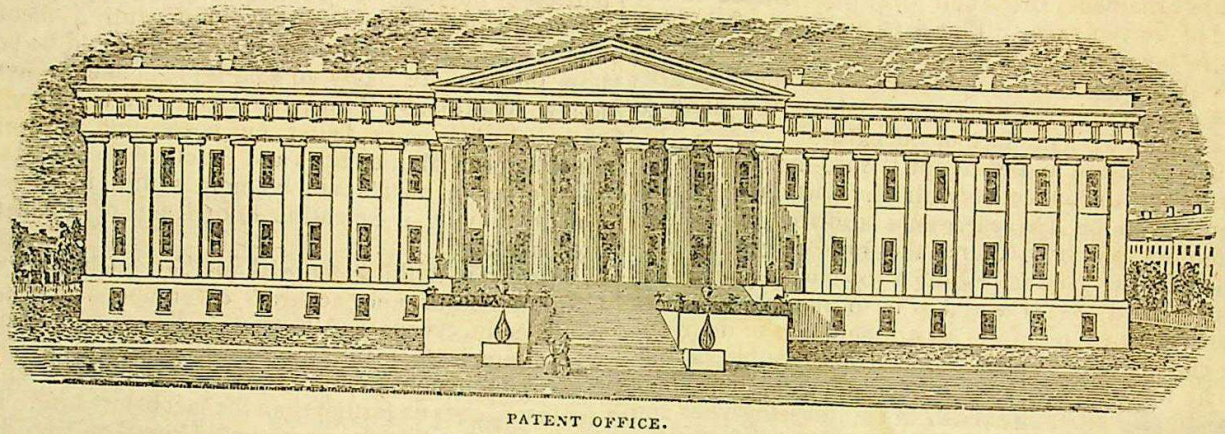
Drawn. & Engraved by C.H.Threep.

Vol. 1. No. 2.

THE MIRROR OF THE PATENT OFFICE, AND AMERICAN JOURNAL

OF IMPROVEMENTS IN THE USEFUL ARTS.

WASHINGTON CITY, D. C.



PATENT OFFICE.

ESSAY ON THE SCIENCES.

The principle end why we are to get knowledge here, is to make use of it for the benefit of ourselves and others in this world.—LOCKE.

THE first duty incumbent upon man is to provide for his own daily subsistence, and those who may be dependant upon him for their sustenance and support. Having accomplished this first duty, there are others also, that follow, that may be considered equally as important to himself and to the community in which he exists, which are too often overlooked, or considered only in a secondary point of view. That is, the devoting his leisure moments to the acquirement of such useful knowledge, as may be separate from that which the common necessities of life bid him to know, and imparting it to his fellow man.

Man unlearned and untaught, may be compared to the slave, or the savage tenant of woods and caves; ignorant of every moral duty and restraint: a mere human beast. Grouping his way through the remote avenues of society, he cannot approach his fellow man, without a feeling of degradation and remorse. But once light up his soul with the torch of knowledge, and how wonderous the change! Like the rough marble under the chisel of the master sculptor, every stroke he makes, adds beauty to its form; until at length it is finished, and we behold an object which fills the mind with admiration and delight.

Knowledge is power,—"a companion," says Phillips, "which no misfortunes can depress, no clime destroy, no enemy alienate, no despotism enslave; at home a friend, abroad an introduction, in solitude a solace, in society an ornament;—it chastens vice, guides virtue, and gives grace and polish to genius."

It is a too common error that the more humble stations in life are ill-suited to the developement of our natural powers; and that efforts to call forth our virtues and our talents are unworthy of trial. We do not reflect enough that the universal good of mankind demands that those endowed with more than common plodding capacities should be called from their ordinary course to higher and more enobling duties. Yet the world is full of the brightest examples of the greatest men, who have been raised from the meanest situations to the highest eminences.

The most valued part of a man's education is that which he acquires himself, and if he possess *energy of mind* sufficient, it makes amends in part, for the want of a more finished course of study. This energy of mind, like the strength of the body, must be constantly exercised; as it is essential to success that we should study to acquire confidence in our own powers. "The astonishing secrets of the physical properties and mechanical powers, disclosed to the well-informed mind," says Mr. Everett in one of his Essays, "present attractions, which, unless the character is deeply sunk, are sufficient to counterbalance the taste for frivolous or corrupt pleasures."

This condition of the mind is different from conceit. It exhibits no vain boasting, but consists in a secret though laudable resolution to make great efforts by persevering industry, to gain the object of our ambition. But with the sceptic, however, we too often conclude that such efforts belong to some plodding fellow, whilst the man of genius accomplishes every thing by a sudden act which costs him nothing. While on the contrary it will be found that all eminent men have been distinguished by

fixing upon some great object, and possessed themselves with such a lively conception of it as to have led them through years of toil. The grand secret of our success consists in availing ourselves of such advantages for increasing our knowledge as are offered to us, but too often neglected, which, if we really possess superior abilities, opportunities are sure to present themselves at some time or other, in the course of our lives, in which to exercise them.

So far as mere *utility* is concerned, knowledge may be confined to those matters which serve to afford us the necessaries of life. "But" says Mr. Channing, "how simple would be the art of building, if it limited itself to the construction of a comfortable shelter. How many ships should we dismantle, and how many busy trades put to rest, were ornament, dress and furniture reduced to the standard of convenience. This *utility* would work great changes in town and country, would level to the dust the wonders of architecture, would annihilate the fine arts, and blot out innumerable beauties, which the hand of taste has spread over the face of the earth."

If it be a pleasure to devote our leisure moments in perusing subjects unconnected with any particular interest or advantage to be derived from a knowledge of them, and which serve only to amuse the mind or gratify curiosity, such for instance as reading a romance or fairy tale, how much more useful would it be to that mind to have it occupied with such objects as are held out to us in the subjects contained in the various Sciences—subjects unequalled by none for their resplendent imagery, and have oftener than any other awakened the slumbering poet and tuned his lyre.

If the Sciences are connected, as they certainly are, with all the practical operations of life, why should they not engage the attention more than they do, of each individual; and not be left to the few men of learning only to investigate their usefulness and various applications? Is there any thing in all the works of fancy or fiction, that can excite more interest than the perusal or study of the various works of Science that teach us the operations of nature or art? Can there be any thing more diverting to the mind, or more wonderful to reflect upon, than to learn the laws which regulate the heavenly bodies taught us by Astronomy—or the extraordinary truths disclosed to us through the science of optics—that the diamond should be made of the same material as coal—that water should be of an inflammable substance—that the air we breathe should be composed of acids strong enough to dissolve the hardest metals—that plants breathe like ourselves, and that the globules of the dust that arise from them and float through the air, continue their race, and are in fact the immediate cause of vegetation.

The gratifying curiosity, the knowing more to-day than we knew yesterday, is an agreeable occupation, and besides it elevates the faculties above low pursuits, and purifies, and refines the mind and passions. To him who will cast aside for once, all idle readings and musings, and turn his thoughts and attentions to the works of Science, will, I am persuaded, rise from his studies with as much gratification and the more pleasurable reflection of having gained a knowledge which he can apply to some practical purpose! To pass our time in the study of the Sciences, in learning what others have discovered, and in extending the bounds of human knowledge, has, in ages past been reckoned the most dignified and happy of human occupations, and the name of philosopher or lover of wisdom is given to those who lead such a life. But it is by no means necessary that a man should do nothing else than study known truths and explore new, in order to earn this high title. Some of the greatest philosophers in all ages, have been engaged in the pursuits of active life; and he who works his day's work, and improves his mind in the evening, is as richly entitled to the name of philosopher, as he whom good fortune has placed beyond necessity's reach.*

The theoretical study of the Sciences not only serve to amuse the mind, but are found of practical utility in all the common walks of life. The mechanic, who is daily handling his tools, acquires a practical knowledge of that portion of the Sciences, connected with his peculiar trade or occupation, imperceptibly; but with a theoretical knowledge, how much more successful would he be, and how much more likely to gain a pre-eminence over his fellow workman. Thus, the Carpenter is likely to accomplish his work better by possessing a theoretical knowledge of Mathematics and Practical Mechanics—and the worker in metals will be more skilful in his occupation by having a Scientific knowledge of the nature of those metals.

Theory is nothing more than the conclusions drawn from numerous and accurate observations of the laws which connect causes with effects. Every man, therefore, who attempts to account for these causes and effects, or draws conclusions therefrom, is a philosopher. The practical man, goes no farther than the fact before him. For example, the practical man sees the lid forced off from a vessel of water, when the water is heated. If he attempts to give a reason, he says, that it was because the steam could not escape, and he resolves the next time to leave a vent. While the Theorist, or philosopher, is led, from this cause and effect to the examination of others, and through a train of investigation and discovery, it terminates in the origin of the steam engine. "In truth," says Mr. Brougham, "he that hath but one pot to boil, is sure to learn from Science lessons which will enable him to cook his morsel better, save his fuel, and both vary and improve his dish."

To leave it to professed philosophers to discover arts, and to invent practical methods for the working man to learn by wrote, he remaining at the same time ignorant of the principles, is not enough, for very plain reasons; if he be ignorant of these principles, and learns his lesson by example only, the least change of circumstances will put him out; for be the rule ever so general, cases will occur where a change from the regular course will be necessary in order to make them apply; and if the workman only knows the rule without knowing the reason, he must of course be at fault the moment he is required to make any new application. The *first* use then to the operator in learning the principles of Science, is, to make him more skilful and expert in his work; and, in the second place, it gives every man a chance, according to his natural talents, of becoming an improver of the particular art or trade in which he may be engaged.

It is true, that as we proceed in our inquiries in the various departments of the Sciences, there are many things

*Brougham's Essays.

that seem incomprehensible and veiled in obscurity, however intently we may study them; yet the progress that has already been made, and is now being rapidly made, encourages us to continued perseverance, and seems to warrant us that light will eventually burst upon our rugged pathway. The *Astronomer* had discovered the laws which regulate the heavenly bodies—the *Geologist* had penetrated the internal structure of the earth—the *Chemist* had analyzed every tangible substance, and ages had passed away, and the acutest philosopher had not yet discovered the influence of that vivid fluid which flashed from the lowering cloud, seemingly bidding defiance to the powers and control of man; but it remained for the daring spirit of Franklin to battle with the elements, and to divert the course of the fiery darts and javelins, hurled by an unseen hand from behind this etherial fortress. It was American Franklin that gave it *electric birth*, and invented the means to thwart this formidable enemy, whose sudden approach spread terror, devastation and death, to every object that came within its pathway. And we may also justly attribute to Franklin, the first idea of *electro magnetism*, by which means we shall ere long hold familiar converse with our *neighbour* at the other end of the continent, and invite his Celestial majesty, *Chow Wow*, to a dish of tea, with as much *sang froid* as did our philosopher catch lightning with a paper kite and silken line.

In looking out upon the broad face of nature, who is there that can contemplate the earth and not be struck with admiration at the beauty and grandeur every where exhibited to his view. The sunny valley—the extended plain—the lofty ice crowned mountain—the meandering river, and the broad and expanded ocean.—Who is there that can enter the forest or the grove, and not be struck with delight as he views this lofty and sublime temple dedicated to nature. What countless tints of green and yellow and auburn—what beautiful contrasts in shade, from the brightest emerald to the darkest green!—In nature's garden what an endless variety of gems; whose species are almost innumerable, and whose colours and tints will beggar description. Such is the great variety in colour and form that no two can be found to exactly resemble each other. Yet when strolling in these pleasure grounds to gaze with admiration upon the objects there exhibited to our view, little do we reflect that although the tasteful hand of art, has served to please the eye, and fill the imagination with delight, that each of these gems are possessed of some virtues, further than the mere gratification of the senses; and that, oftentimes, there lies hidden beneath the folds of those flowers that create our greatest admiration, the weapons of instantaneous death; or, on the other hand, antidotes against the deadliest poisons. And, while we pass almost unobserved, the simplest herbs and plants that line our pathway, yet did we know their virtues, we would find a cure for some malady that was destroying the pleasures and happiness of our hourly existence.

It is to the Science of *Botany* or *Vegetable Phisiology*, then, that we are indebted for a knowledge of the structure and habit of plants, as well as their arrangement and classification; and to *Chemistry* for their medicinal and other qualities.

The next subject which seems to follow in course, is to learn how this numerous family of nature is sustained. The Science of *Meteorology* teaches us the nature of the atmosphere that surrounds the earth; and from whence comes that immense collection of waters, that float in the heavens, and are distributed through all its parts, watering it in proportion to its wants. It is from the atmosphere that the winds proceed, without which, the inhabitants of the earth could not exist; and although, they sometimes rage in storms and tempests, carrying destruction in their course, yet they serve to purify the air, and aid also in fertilizing the earth.

The ocean—the lakes—the rivers, and the springs, so generally distributed over the surface of the earth, not only serve to beautify its aspect, but afford a constant supply of moisture, which after having been raised into the atmosphere and formed into clouds, descends again in showers to fertilize the soil; afford nourishment to its products, and to all animated beings. The sea itself, that vast collection of globules and fountain of vapours, occupying more than three parts of the globe—its tides and mighty currents—its vast concavity—the myriad of animals it contains, the multitude of shells, gems, and plants, which grow invisibly to our sight—some floating with the wind and at the mercy of the waves, others rising from its bed to the surface, all receiving nourishment from its saline particles, and giving sustenance in return, to its innumerable inhabitants, furnish subjects for deep thought and pleasing speculation. Sophocles considered the ocean the finest and most beautiful object in nature, filling every contemplative mind with a grateful awe, which bears witness that it acknowledges the hand of the Deity.

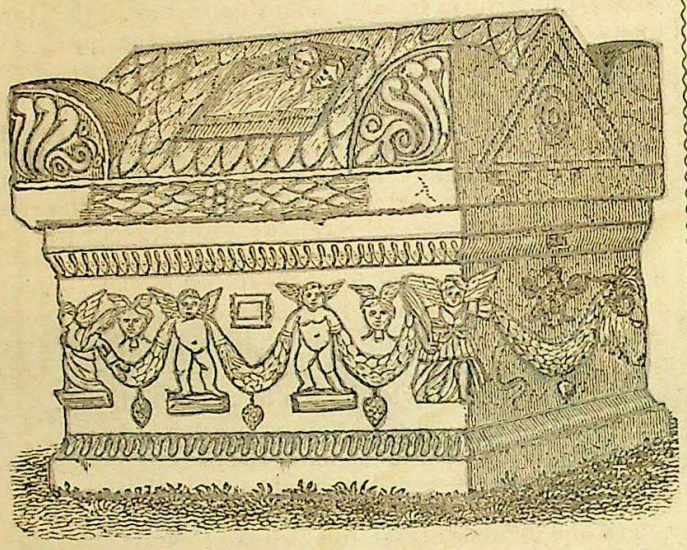
> "Calm or convulsed—in breeze, or gale, or storm,
> Icing the pole, or in the torrid clime
> Dark heaving;—boundless, endless, and sublime—
> The image of Eternity—the throne
> Of the invisible: even from out thy slime,
> The monsters of the deep are made; each zone
> Obeys thee; thou goes forth, dread fathomless, alone."

Yet, though mighty in power and strength, like a vassal the ocean hath become obedient to man, "he maketh the winds his steeds, and the ocean his chariots; the luxuries of the East are rocked upon its bosom, and the armada rides upon its billows."

The contemplation of the heavens naturally call forth feelings of the most exalted character; not confined alone to the grave philosopher, but enjoyed equally by all. But is it not two true that we constantly witness the splendour of a glorious sun set, or gaze listlessly upon the serene beauty of a starlight night, or when the moon casts its mellow light upon the earth—without any peculiar feelings or reflections, further than the mere pleasure and gratification it affords to our senses? But when we consider all these beautiful phenomena of nature in a Scientific point of view, we learn that we are indebted to the Science of *Astronomy* for unfolding these mysteries, and for teaching us the laws which regulate these heavenly bodies—and, together with the Science of *Optics*, Astronomers have been enabled to observe not only the figures of the stars and planets visible to the naked eye, but to discover others that are hidden from our view; which to enumerate, would be as impossible, as to count the grains of sand upon the surface of the earth. With the aid also, of the Sciences of *Geometry* and *Mathematics*, they have been enabled to form tables calculating the motions of these planets; thereby aiding the Mariner to learn

in what part of the ocean he is situated, how far he has sailed, and in what direction he is to steer his course in order to reach his port of destination.

Such are a few of the auxiliaries of Science, which will not only store our minds with useful knowledge, but serve to afford us amusement in the hours of retirement. Let us conclude then in the language of an eminent writer, "that the pleasure derived from the study of the Sciences go hand in hand with the solid benefits derived from them; and that they tend unlike other gratifications not only to make our lives more agreeable, but better; and that a rational being is bound by every motive of interest and duty, to direct his mind towards pursuits, which are found to be the sure path of virtue as well as of happiness." ED.



SARCOPHAGUS.

The above cut represents the SARCOPHAGUS, brought home by the late Commodore Elliott, on board of the United States' Frigate Constitution, in the year 1839, and is now deposited in the NATIONAL INSTITUTE. Through the politeness of the Secretary of the Institute, we are enabled to lay before our patrons the following correspondence in relation thereto. The patriotic sentiments contained in the letter of the venerated JACKSON, are those of a true republican, and deserve to be treasured as such, in the heart of every American.

Commodore Elliott's Address to the National Institute.

GENTLEMEN OF THE NATIONAL INSTITUTE:

I feel both pride and pleasure in addressing the members of this Institute. It is, and ought to be, national, and every citizen of these United States should be proud to lend his aid to promote its national objects; and most happy am I to learn that a portion of the officers of the Navy have not been backward on the occasion.

The moment I found myself elected a corresponding member, I addressed a letter to your secretary, expressing my gratification, but that was not sufficient: I immediately began to inquire what service I could render to a cause I so highly approved. I wrote a second letter, for the purpose of offering to the Institute, upon certain conditions, a very curious and valuable relic of antiquity, namely a superb sarcophagus, supposed to have contained the remains of the Roman Emperor, Alexander Severus—a conclusion at which I arrived, with the sanction, after full investigation, of Sir JOHN STODDARD, chief justice of the island of Malta, and of two learned Maltese antiquarians. The paper I hold in my hand contains an accurate engraving of a sarcophagus, and its hieroglyphics, of a similar kind, and found at the same spot, supposed, from its inscription, to be the sarcophagus of the mother of the Emperor, Julia Mammœa, who was Regent of the Roman Empire during the minority of her son. This antique I have presented to the Girard College, in the hope that it would receive the remains of that great philanthropist.

It may, perhaps, be proper to offer a few remarks in relation to the introduction into our country of these two sarcophagi, which I brought home with me on board the United States frigate Constitution, in 1839.

It was my good fortune to see several sarcophagi at Rome, and others at Ephesus, in Asia Minor; and afterwards, on my entering at the Gate of Jerusalem, a splendid marble sarcophagus, used as a watering trough for animals, I tried to obtain, and to transport it to the coast. Such, however, was the state of the roads, that I was soon convinced that its transportation was impracticable.

Understanding, at a late period, that two immense sarcophagi had been found at Beyroot, in the Holy Land, I lost no time in sending for and purchasing them. This lithograph drawing, as I have already said, represents one of them.

Another lithograph, which I will send on with the sarcophagus, undoubtedly represents the coffin of Alexander Severus. The one is intended for the body of STEPHEN GIRARD. The other I had destined for the generous SMITHSON; but, failing in my wishes in this latter point, it occurred to me that it would form a noble receptacle for ANDREW JACKSON.

Impelled by this consideration, I can only express to you my fervent hope, that this sarcophagus will be received and retained by the NATIONAL INSTITUTE, until it be carried to its final resting place, where, containing all that is mortal of the patriot and hero, ANDREW JACKSON, it will, for a long succession of years, be visited as a hallowed relic.

Gentlemen, I propose also to present to the Institute a marble slab, a portion of the temple erected by Miltiades at the last retreating spot which bore the tread of the Persian, driven into the ocean by the triumphant Greeks at Marathon. This interesting slab, gentlemen, I obtained myself at the spot, where I was accompanied by our countryman, Gen. LEWIS CASS.

Gentlemen, accept my best wishes for your entire success.

JESSE DUNCAN ELLIOTT,
United States Navy.

Address of Captain G. W. Hughes, of the Topographical Engineers, before the Institute, on the presentation of the Sarcophagus intended for the remains of Andrew Jackson.

Captain H. had no intention of making a speech, but could not resist the impulse of offering a few remarks in reference to the interesting event which had just transpired; and he believed that the members of the Institute would agree with him in saying that, since the foundation of the society, they had never been called on to participate in a more touching and imposing ceremony, nor one more full of moral sublimity, than that which they had just witnessed, in the tribute of respect and veneration paid by a distinguished and chivalrous officer of our navy to a gallant and illustrious soldier; and he considered the Institute as being highly honored, in being thus made the depository of this antique and classical sarcophagus, which, it is believed, once held the remains of ALEXANDER SEVERUS—fit resting place for all that is mortal of ANDREW JACKSON, "the noblest Roman of them all."

Captain H. indulged the hope that the brilliant example of the old warriors, of both branches of our military service, would not be lost on their successors, who, he trusted, would emulate their devotion to the republic by fighting its battles in war, and in aiding the advancement of science in time of peace. He then referred, in highly complementary terms to Commodore Elliott's continued and successful efforts in the cause of agriculture, science, and the fine arts.

Captain HUGHES then offered the following resolutions:

Resolved, That the NATIONAL INSTITUTE accept the sarcophagus offered by Commodore JESSE D. ELLIOTT, of the U. S. Navy, as a deposite, subject to the conditions upon which the offer has been made.

Resolved, That the thanks of the Institute be presented to Commodore ELLIOTT, and that he be hereby requested to furnish a copy of the remarks he has just addressed to the meeting upon the subject of the deposite, and that the same be published.

Resolved, That a committee of one person be appointed by the president of the Institute, to co-operate with such persons as Commodore ELLIOTT may select, to convey and to deposite the sarcophagus at Washington.

Capt. G. W. HUGHES was appointed the committee on the part of the Institute, and JOHN K. KANE, of Philadelphia, by Commodore ELLIOTT.

Gen. Jackson's Reply to Commodore Elliott.

HERMITAGE, *March* 27, 1845.

DEAR SIR: Your letter of the 18th instant, together with the copy of the proceedings of the NATIONAL INSTITUTE, furnished me by their corresponding secretary, on the presentation, by you, of the sarcophagus for their acceptance, on condition it shall be preserved, and in honor of my memory, have been received, and are now before me.

Although laboring under great debility and affliction from a severe attack, from which I may not recover, I raise my pen and endeavor to reply. The steadiness of my nerves, may perhaps, lead you to conclude my prostration of strength is not so great as here expressed. Strange as it may appear, my nerves are as steady as they were forty years gone by; whilst, from debility and affliction, I am gasping for breath.

I have read the whole proceedings of the presentation, by you, of the sarcophagus, and the resolutions passed by the board of directors, so honorable to my fame, with sensations and feelings more easily to be conjectured than by me expressed. The whole proceedings call for my most grateful thanks, which are hereby tendered to you, and through you to the president and directors of the NATIONAL INSTITUTE. But with the

warmest sensations that can inspire a grateful heart, I must decline accepting the honor intended to be bestowed. I cannot consent that my mortal body shall be laid in a repository prepared for an emperor or a king. My republican feelings and principles forbid it; the simplicity of our system of government forbids it. Every monument erected to perpetuate the memory of our heroes and statesmen ought to bear evidence of the economy and simplicity of our republican institutions, and the plainness of our republican citizens, who are the sovereigns of our glorious Union, and whose virtue is to perpetuate it. True virtue cannot exist, where pomp and parade are the governing passions, it can only dwell with the people—the great laboring and producing classes, that form the bone and sinew of our confederacy.

For these reasons I cannot accept the honor you, and the president and directors of the NATIONAL INSTITUTE, intended to bestow. I cannot permit my remains to be the first in these United States to be deposited in a sarcophagus made for an Emperor or a King. I again repeat, please accept for yourself, and convey to the president and directors, of the NATIONAL INSTITUTE, my most profound respects for the honor you and they intended to bestow. I have prepared an humble depository for my mortal body beside that wherein lies my beloved wife, where, without any pomp or parade, I have requested, when my God calls me to sleep with my fathers, to be laid—for both of us there to remain, until the last trumpet sounds to call the dead to judgment, when we, I hope, shall rise together, clothed with that heavenly body promised to all who believe in our glorious Redeemer, who died for us that we might live, and by whose atonement I hope for a blessed immortality.

I am, with great respect, your friend and fellow-citizen,

ANDREW JACKSON.

To Com. J. D. ELLIOTT, *United States Navy.*

Commodore Jesse D. Elliott's Letter of Presentation.

NAVY YARD, PHILADELPHIA, *April* 8, 1845.

GENTLEMEN: The interest which the NATIONAL INSTITUTE has been pleased to take in the eventual bestowment of the remains of the honored Andrew Jackson in the sarcophagus which I brought from abroad, and deposited in your Institute, makes it my business now to communicate to you a copy of his letter of the 27th ultimo, lately received, on that subject.

With sentiments so congenial to his strict republicanism, and in accordance, indeed with the republican feelings common to ourselves, he takes the ground of repugnance to connecting his name and fame in any way with imperial associations.

We cannot but honor the sentiments which have ruled his judgment in the case; for they are such as must add to the lustre of his character.—We subscribe to them ourselves; and, while we yield to their force, we may still be permitted to continue our regard to the enduring marble, as to an ancient and classic relic—a curiosity in itself, and particularly in this country, as the first of its kind seen in our western hemisphere.

From it we would deduce the moral, that, while we would disclaim the pride, pomp, and circumstance of imperial pageantry, as unfitting our institutions and professions, we would sedulously cherish the simpler republican principles of reposing our fame and honors in the hearts and affections of our countrymen.

I have now, in conclusion, to say that, as the sarcophagus was originally presented with the suggestion of useing it as abovementioned, I now commit it wholly to the Institute as their own and sole property, exempt from any condition.

I am, very respectfully, yours, &c.,

JESSE DUNCAN ELLIOTT.

To the PRESIDENT AND DIRECTORS OF THE NATIONAL INSTITUTE, at Washington.

NEW CHECK LOOM.

THE Mechanics' Mirror, for February, notices a new machine of this description, the invention of Mr. Peacock, of *Ida Mills*, Troy, which promises to be of much utility. The Mirror says:

Of its originality there is no doubt; in the simplicity and beauty of its operations, there is no ambiguity; its advantages, time alone will fully develope.

When we remember, that but eight years ago, there was not a *check loom* in this State, and when in the year following, James Allen brought his check loom into this country, it was looked upon as something extraordinary; and when we now reflect that but two colors could be wove equally by it in the weft, and that now, no less than four colors can be wove and with a variation of from two, to two hundred and twenty pickings; well may we be surprised at the rapid improvement, we should say, at the leaps made since then in the progress and perfection of power loom weaving.

Very good ginghams could be manufactured by the two-shuttle loom of Mr. Allen, but there was not enough of variation in the colors, and to give a great variety of shades in the warp, the fabric will neither be correct nor chaste; there must be a balancing of shades in the crossing, or the work looks disproportioned and untastefully executed. There is nearly as large a field for the display of taste and skill in gingham, as in harness loom weaving. The choice of colors, their blending, shading and contrasting, require both taste and skill; the two shuttle loom presented but little room for variation, but a wide field was soon opened by the addition of another shuttle. But although the three shuttle looms make a beautiful fabric and work well, yet by the shuttle moving up and down in a sliding box there is not that variation in the picking, which is requisite in the weaving of some patterns.

The idea suggeseld itself by Mr. Peacock more than a year ago, that the shuttles of the *check loom*, might be made to revolve on a cylinder in more numbers than by a sliding box; the same idea presented itself to another man at nearly the same time—Mr. Neal of Taunton, Mass., who invented the revolving box of the present four-shuttle loom; and for which he has got a patent in America and England. The great difference between the sliding box and the revolving one, is that more colors can be used in the weft by the latter than the former, consequently a greater variety of pattern.

The beauty of gingham depends upon the arrangement of colors; and according to their absorbing or reflective nature, a greater number of threads of the one and fewer of the other, may be required for correct blending and good contrast. Mr. Neal's loom was at fault in this respect, for his patterns were wrought by two notched wheels and they all presented a homely sameness of colors. But this difficulty is beautifully surmounted by the *check loom* at Ida Mills. Mr. Peacock, the agent of the factory, has invented a single pattern wheel which can weave a pattern from two, to two hundred and twenty pickings, as has been mentioned before: but the great beauty of the invention, is, that this wheel can be altered to work any pattern whatever. The pattern wheel is studded with moveable iron pinions, each pin has two pickings, and by removing one, two, or more, you can change the threads of the colors in endless variety; also when the revolving box has performed a semi-revolution, it can spring back, and two shuttles in this manner can make three stripes, one stripe of blue may be bounded on each side by a stripe of orange. The first time we saw this loom, the pattern wheel struck us as being the most beautiful invention; at that time we did not know that Mr. Peacock was the inventor, and we consider that it is an act of justice to notice the invention in so special a manner; for he has not taken out a patent although advised to do so by no less a personage than Mr. Benjamin Walcott of York Mills; this article will therefore prevent any other person who may hereafter claim the invention. It was in Ida Mills where the pattern of gingham was wove, which took the gold medal at the last New York State Fair.

From the opinion of Mr. Peacock, (and he is a gentleman of great experience, knowledge and skill,) the loom can be greatly improved, but from the principles on which it is formed, it is calculated to produce an entire revolution in power-loom weaving. The hint and advice of Mr. Walcott speaks volumes in its praise; yet unless the machinery is correct to an hair breadth, there is no profit to the weaver or manufacturer.

NIGHT NECESSARY FOR TREES.—The botanist Gaubert, in a recent sitting of the French Academy of Sciences, attributed the remarkable mortality of the trees in the Parisian Boulevards to the nightly illumination with gas, since the trees as well as living creatures need to repose at night.—*Deutsche Schnellpost.*

JAMES SEMPLE'S PRAIRIE CAR.

THROUGH the politeness of Gen. Semple, we are enabled to lay before our readers an account of the experiments made by that gentleman, in order to test the practicability of running a Car by the power of Steam, on the common prairies, without the expense of making a road. The accompanying drawing will show the construction of the Car.

A frame is constructed in the shape of a parallelogram twenty-six feet long and nineteen feet wide, more or less, with two or more cross pieces, all strongly ironed and bolted together, see A A A A, Fig. 1, in the Engraving. I add two longitudinal beams, to which may be attached, the driving power and the necessary machinery B B. Between the parallel timbers on each side of the frame, I run 4 driving wheels C C C C, each on a separate axle, or two on 1 axle as may be desired for 2 or 4 steam cylinders, & to which I apply the power at D D The driving wheels C C C C, I construct in the following manner, viz: they are hollow cylinders of hollow iron or wood, six feet in diameter, and five feet tread, more or less, closed at the ends. The object in making them so wide is to prevent their sinking into the soft earth, and they are made hollow and closed at the ends to give them greater lightness and buoyancy—they may be made rough on the outside surface, to give the greater adhesion. The guiding wheels E E, are on a separate frame which turns on a pivot at F, and slides under the main frame as shown at G in fig. 2.

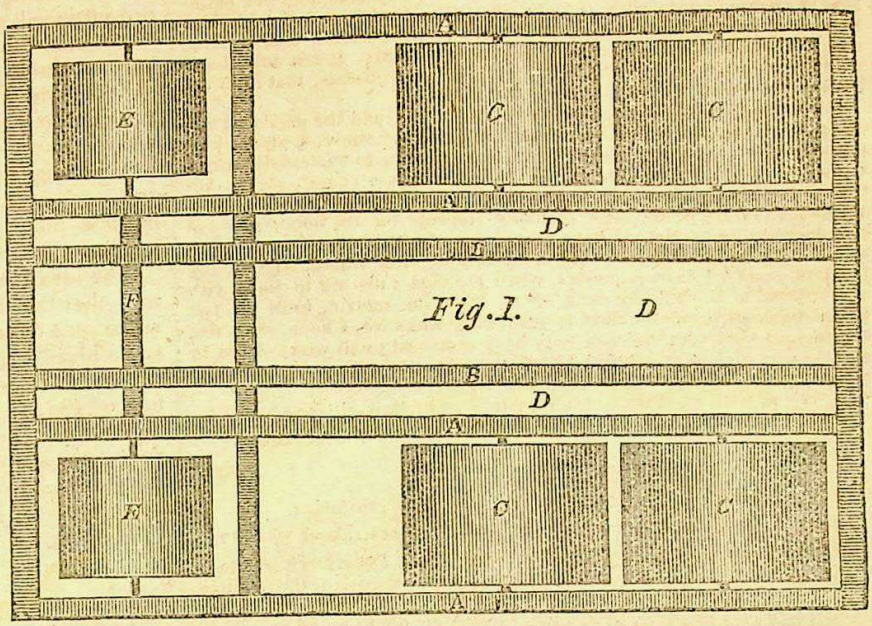


Fig. 1.

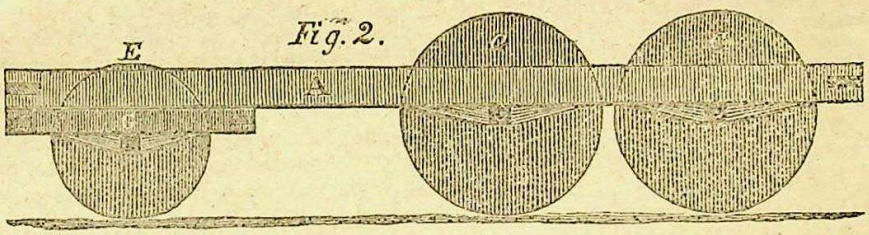


Fig. 2.

They are made like the driving wheels and always on separate axles, and are five feet in diameter, with four and a half tread, more or less. The size will be as much less in diameter than the driving wheels as will make the lower part of the wheels on a level with the driving wheels, when the centre is placed below the guiding frame, as shown in fig. 2, and the tread will be sufficiently narrow to allow the wheels to play within the large frame, while turning a curve say on a radius of 400 feet. The guiding frame is turned in the same manner that Steam Coaches are turned on common roads. The power is applied by any of the ordinary modes. The above description applies to the Locomotive.—The freight and passenger cars will be made of the same kind of wheels, &c.

We extract the following from a letter writen by Gen. SEMPLE, to a Committee at Springfield, Illinois, in answer to enquiries as to the prospect of successfully running these cars by the power of Steam on the common prairie.

"I have, for many years, devoted a great deal of my time to the subject of internal communication. The rapid strides which the power of steam has made within a few years, in navigation on our great western rivers, and in driving the rapid car over our numerous railroads—the consequent increase of intercommunication with the distant parts of the United States, the reduction of freights, and the consequent increase of the value of the productions of the soil in the interior States, would scarcely fail, at every step, to attract the attention of all who took pride in the improvement, and felt an interest in the prosperity of his country.

Long before I had matured any plan, I had often thought that at some period or other, a mode would be adopted to *navigate* by steam the great *ocean* prairies of the West. The peculiar situation of our State is such that we can never make canals, except in a few particular places; because we have no water above the summit level—the land being every where above the supply of water. We can never make McAdamized roads, because we have no stone, except at such great distances from the places where it would be required, that the expense of making such roads would exceed any profit that could be reasonably expected from them. Railroads then, are the only kind of internal communication that can ever be made to advantage in Illinois.

We have met with such a back set by the *bad management* of our internal improvement system, that it is at this day hopeless, and worse than useless to attempt to renew it, or to expect that money can be obtained, for many years to come, for the purpose of constructing such roads as even the present state of the country seem imperiously to demand.

My anxiety on this subject induced me to make some actual experiments, in order to test the possibility of so constructing a carriage as to run it, by the power of steam, over the common prairies, *without any expense whatever in constructing a road.* I have satisfied myself, beyond the possibility of a doubt, of the entire practicability of effecting this desirable object.

I have for years past, from time to time, made experiments on a very small scale, all of which encourages me to go on, and test the principle still farther. Of all these it is unnecessary now to give any account, especially as I kept the matter entirely to myself, and no one ever knew that I had ever thought of such a thing. The first public experiment that I ever made, was in Baltimore, in March 1844. I communicated my plan to Mr. Ross Winans of Baltimore, a man of great scientific information, and long celebrated both in America and Europe as one of the most ingenious civil engineers and locomotive manufacturers in the country. Mr. Winans confessed to me that it was certainly the most novel, and should it prove successful, it

would be one among the most important projects that had ever been suggested. Having consulted with Mr. Winans as to the best mode of making practical experiments, I proceeded to make an experiment of the quantum of resistance on a very small scale, which, being in the presence of an experienced engineer and machinist, was more satisfactory than any I had previously made, though this was by no means a fair test.

On Wednesday, the 27th day of March 1844, I took two cast iron wheels of unequal size, but averaging 15 inches diameter, and 11 inches wide on the tread, with an axle of about one inch diameter, and a bearing on each end of the axle of three inches. The wheels going fore and aft of each other were prevented from turning over by the width of eleven inches as aforesaid. On these two wheels I placed weights, so as to make the whole weight of the carriage and load to be 735 pounds. With this weight I drew it over a plate of iron laid level on the ground, and the power necessary to draw it was found to be equal to 9 pounds. On the same plate of iron, with the weight of 1415 pounds, the resistance was equal to 22½ pounds. I then placed the same machine on very hard, firm ground, and the resistance was, with 735 lbs., equal to 30 lbs., and with 1415 lbs., equal to 55 lbs. I then placed the same machine on soft ground, with a blue grass sod, with the weight of 735 lbs., the resistance was found to be equal to 70 lbs., and with 1415 lbs., equal to 180 lbs.

The above described carriage, and the weight of 1415 lbs., was thought to be equal to 20 tons on eight wheels five feet in diameter, and four feet tread.

Mr. Winans said that, according to the above experiment *on the grass sod,* an engine could be made that would on such ground be made to draw four times its own weight.

I again went to Baltimore in June, after the adjournment of Congress and proceeded to make further experiments.

I caused a temporary car to be made of the following dimensions. There were six wheels made of wood, in the manner of an ordinary drum for driving machinery. The heads were of inch oak boards, crossed and pinned together; the rim was of white pine, nailed on, and then turned in a lathe with common exactness. The wheels were 19½ inches in diameter, and 18 inches wide on the tread. They were placed on axles of iron turned with great care, and placed eighteen inches apart. The axles were 5 feet 3 inches long, having a bearing of 2½ inches at each end, in iron boxes on a diameter of one inch, and a bearing in the centre of 2½ inches in another box with a diameter of 1½ inches. Two of these axles, with four of the wheels, were fixed in a frame permanently together, and the wheels made fast to the axle so that they all turned together, and the weight was placed on a centre, bearing equally on all four of the wheels, but at the same time allowing the wheels to give way and accommodate themselves to the inequalities of the ground. The two fore wheels were placed on a separate frame made to work under the frame to which the hind wheels were attached, and turning on a pivot in the centre so as to guide the direction of the car. One of the fore wheels was made loose on the axle. The two frames were connected together by two braces resting on a round bar of iron, over the centre, between the two hind axles, and on a pivot over the centre of the fore axle of the car the whole weighing 708 lbs. I then fastened an iron pulley to the fore end of the car, over which I drew a rope one end of which was made fast to the ground, in order to lessen the degree of force necessary to draw the car; the other end I drew with a pair of spring stilyards, to test the weight or power necessary to draw the car. I placed the car on common grass sod, on dry, level land, and the results of several trials were as follows:

1st. The car weighing 707 lbs., required a weight of 32 lbs. to draw it.

2d. I then placed on the car, 585 lbs. of iron, and the weight required to draw it was 60 lbs., over the same ground.

3d. I then placed on the car an additional 620 lbs. of iron, making with the car, the entire weight of 1912, to be drawn, and this required 80 lbs. over the same ground. The power necessary to draw the car not increasing in proportion to the additional weight.

4th. I then turned the fore wheels so as to make the car run on a curve. The fore axle was turned equal to one inch, on the extremity of a circle 22 inches in diameter, which would be equal to a curve on a radius of 100 feet; or in other words, would make the car run round a circle of 200 feet diameter. I did this to make two tests—first, to see whether the two fore wheels would control or guide the four hind wheels, they being all fixed permanently to one frame, and also fixed on the axles; and second, to see whether any, and if any, what, would be the additional force necessary to draw the car. I found that the car was guided with perfect ease, and that the additional force necessary to draw the car was about five pounds, say for the whole weights aforesaid, 90 lbs. After running the car some ten or twelve times over the same road, I could not discover any material diminution of force necessary to draw the car; that is to say, the packing or hardening the ground by the frequent running over the ground, did not make the car run a great deal lighter. The ground being quite firm, the car made no track on the ground that could be seen.

5th. I then, instead of drawing the car by a rope over a pulley, applied the power to the *two* hindmost wheels, in order to test the *adhesion;* the whole car with the whole weights aforesaid, was driven along by this operation, without any sliding round of the wheels.

These experiments were made on Saturday, 27th June, 1844. After which it was believed that there was some wedging or pinching in the boxes which made a much greater degree of friction than was necessary. I had the boxes all taken out and re-bored, in order to remedy this defect, and also to fix two iron cog wheels on the axles, that I might with greater certainty test the adhesion.

The boxes having been re-bored, and a cog wheel fixed to one of the axles to test the adhesion, I placed the same car on very soft ground, where a horse and cart with 3-4 of a cord of pine wood could not go through, and had to be pushed out—the wheel of the cart sank in 5½ inches at every step. The ground was very rough, but the wheels of the car made it smooth, and sunk in scarcely any.

1st. The adhesion proved sufficient for two wheels to drive the heaviest weights through this ground, that is 2150 pounds.

2d. With the car without any weights, being with cog wheel 750 lbs., required 48 lbs. to drive it.

3d. With 780 lbs. on the car, the resistance was 160.

4th. With 620 lbs. more, making with the car 2150 lbs., on the same ground the resistance was 240.

5th. On a little harder ground, but still a swamp, the resistance was 160.

These experiments not proving quite as satisfactory as I desired, I determined to try a wheel of the same size and dimensions which I proposed to construct for the coach I intended to run. I accordingly caused a wheel to be made of wood, six feet diameter, by five feet tread, with an iron axle, the whole wheel with the axle weighing 1108 lbs. The frame on which the weights were placed weighed 806 lbs. I then added 87 lbs. of iron which made the whole weight 2000 lbs. The axle had four bearings, two of 1 3-4 inches diameter, and two of 2 inches diameter, and each of the four bearings bore 4 1-2 inches along the axle.

I then caused about forty feet of common earth to be spaded up to the depth of the spade, as if it were prepared for common garden purposes—then caused the wheel to be rolled over it some dozed times, and then commenced the experiments with

a weight over a pulley, trying the resistance both ways, and taking the average so that in the event of there being any ascent one way or the other, I would ascertain the average and true resistance, and I found the resistance of the whole 2000 lbs. to be thirty lbs. over the pulley.

I then added 1119 lbs. of iron, making the whole insistent weight 2012 pounds, and the total weight, including the wheel, 3119 lbs. The resistance was found to be 52 lbs., or 33 lbs. per ton of the whole weight.

I then added 992 lbs. more of iron, making the whole insistent weigh 3004 lbs., and the total weight including the wheel, 4112 lbs. At this weight the resistance proved to 64 lbs., being 32 lbs, per ton. of the whole weight, and about 16 lbs. per thousand of the insistent weight. I then added 1001 lbs. more of iron, making the whole insistent weight 4001 lbs. and the total weight including the wheel, 5112 lbs. At this weight, the resistance proved to be 88 lbs., being 34 lbs., per ton of the whole weight, and about 17 60-100 lbs. per thousand of insistent weight.

The axles of the wheel being large in proportion to the size of the wheel, with four bearings instead of two, and entirely new, never having been used or worn, I concluded that the resistance arising from the friction of the axle must be greater than would be found in a properly constructed carriage. In order therefore to test as far as practicable the amount of resistance produced by this friction, independant of the rolling resistence of the wheel, I suspended the wheel in the same frame, having the same rubbing friction on the axles, but only the weight of the wheel, which was 1108 lbs. I then applied the weight to a cord wound round the wheel, and I found this friction resistance to be 8 lbs., or nearly 16 lbs. per ton. Supposing this to be entirely too great, being nearly double that of a railroad, I examined the boxes over the axles, and found that they were too tight. I unscrewed them and made them quite loose. The resistance then proved to be 6 lbs., or about 11 lbs. per ton. This was still greater than that of a rail road, which is estimated at 7½ lbs. This, however, was readily accounted for, from greater diameter, and unworn state of the axle.

All the foregoing experiments, I tried also with the spring balance, in order to compare them with the experiments made last year, which were made with the spring balance only. I found that the results were nearly the same as those made with the weight over the pulley.

The ground having been packed by the rolling over it the heavier weights, I took out the additional weights and reduced the machine again to the original weight of 2000 lbs., and the resistance was found to be only 20 lbs! This result was very satisfactory, having been reduced one third by the packing of the ground. It must be observed, however, that the journals of the axle had been loosened to lessen the resistance produced by the rubbing friction, which would lessen the former resistance at least 6 lbs. per ton. So that only 4 lbs. per ton could properly be said to have been reduced from the rolling resistance of the wheel by the packing of the ground. I then caused the ground to be completely saturated with water, making it equal to a rain covering the ground an inch deep, and then went through with the same experiments. The same evening the resistance was found to be 48 lbs. to the ton. The next evening, with three additional wettings and the water standing on the ground, it was 61 lbs. to the ton. I then took spikes of iron and worked up the ground, an operation similar to coultering, loosening it without turning it over, and then poured this ground full of water, so that in walking over it the water spouted out at every step on part of the space over which the wheel had to pass, the ground would sink like mortar with the tread of the foot. In this state of the ground, the resistance was 88 pounds per ton, there being on the wheel, the whole weight aforesaid, 5112 lbs.

In order to test the solidity of the ground, at the different trials, I took a round rod of iron an inch in diameter, and about two feet long, weighing 7½ lbs., and let it fall from the height of six feet, previous to the wetting the ground, and when the resistence was 20 lbs. per ton, as aforesaid, it sunk in the ground 7-8 of an inch in several trials at different parts of the ground. After the ground had been wet and lay all night, the same rod at six feet fall sunk into the ground 2½ inches. This was when the resistance was 61 as aforesaid. But after the ground had been worked up and again saturated, when the resistance was 88 lbs., the same rod sunk in at 6 feet fall. 3½ inches.

When I completed these experiments, Mr. Winans expressed to me his entire confidence in being able to run this car over ordinary level land, at the rate of ten miles an hour, and draw after it four times the weight of the engine.

The foregoing experiments will probably be more satisfactory to practical engineers, and they can draw from them more certain conclusions than they can from the experiments I have, during, the present fall, made with the steam engine. But as an experiment with the steam engine was necessary, as well for the satisfaction of the public, as to test how the car would run on the Prairie sod with the weight of eight or ten tons, I caused a car to be made, the frame of which, from out to out, was twenty-five feet long and fifteen feet wide. It had four wheels, the hind wheels were six feet three inches diameter, and four feet in the tread. The fore wheels were five feet three inches diameter and three feet tread. The wheels were made of wood with iron axles, and bound with three iron bands; each wheel turned on its own axle, supported by the frame outside and in. The hind axles were made of round iron, three inches diameter, and had a bearing in four inch boxes of 2¾ diameter: the four axles were made of round iron, two inches diameter, and had a bearing in four inch boxes of 1¾ inches diameter. The wheels and axles weighed 2,900 pounds, the frame weighed 3,080 pounds; making in all, without the engine 6,040 pounds.

After the car was got up on the Prairie, while the axles were new and rough from the lathe, I placed on the car the weight of seven hundred pounds and fifteen persons, averaging 150 each, making with the car nine thousand pounds. With this weight two mules went off with it for half a mile, over the rough Prairie, with a heavy coat of grass on the Prairie, at the rate of about three or four miles an hour.

On Tuesday the 26th of August, I started to Springfield with the car, with six mules attached to it, I put this additional number of mules for the greater ease in driving, and because the distance was great, I made the trip to the place where I afterwards put the engine on the car, near Springfield, in about thirty-six hours travelling. I procured one of the old locomotives which had been used on the Meredosia and Springfield rail road, being very much out of repair. It was called a seven ton engine made by M. W. Baldwin of Philadelphia, No. 127. I took off the wheels, the pedestals, and springs. I had no means of weighing that part which I put on my car, but from the best information I could obtain from the engineers who had run the engine on the rail road, and who pretended to know the weight of the different parts of the engine. I took from the engine about three and a half tons, leaving three and a half as the weight of the boiler and machinery. To this must be added one thousand seven hundred and eighty-two pounds the weight of the shafts, cog wheels, cranks, and braces which I added, making the whole weight of the car with the boiler and machinery, exclusive of the water in the boiler 14822 lbs. The water in the boiler and tender and the wood on the car, I estimated at 3000 pounds; so that when the car started under the steam, the whole weight was 17822 pounds. I coupled to one wheel only in order to try the adhesion, intending to couple to another in case one proved insufficient. The car

was guided by a wheel similar to those used on steamboats, to which was attached a rope that turned the under frame and fore wheels to the right or the left, as desired, and which controlled the direction of the car. When the steam was applied, the car moved off, the wheel not slipping an inch; thus proving that the adhesion of one wheel was sufficient. The steam was low, not being as the engineer assured me, more than one fifth of the power of the engine. On the 17th September, I caused the car to be run some two miles backwards and forwards, without any accident, the power of the engine never being exerted to more than one fifth, or at most to one fourth of its power, the adhesion of one wheel proving amply sufficient and the car moving on the rough Prairie with less jolting than on the railroad. I did not attempt any greater velocity, on account of the high grass in the Prairie which prevented us from seeing any obstacle ahead; intending to try a greater velocity after I had got a beaten track through. At one time the car went at the rate of about 5 or 6 miles an hour. On the 20th, I started the car again in the presence of some fifty or sixty persons, who had collected to witness the experiment: every thing moved with ease as before, but after going about half a mile, one of the cog wheels broke, and I was obliged to stop any further trial. I regretted this, as well because it prevented me from trying the velocity as I had intended, as also, because many persons who arrived on the ground after the accident, were prevented from seeing the performance of the car.

In making all new experiments we are obliged to learn as we go along: so in this case, I soon found that in endeavoring to make the car as light as possible, I had made the frame and machinery all too weak. This defect I can easily remedy in any future attempt.

Had this been the first attempt to run a coach by land with the power of steam, there would have been many difficulties yet to overcome. But science has at this day progressed so far that there remains but a few simple enquiries to be made to prove to every gentleman at all acquainted with such things, whether the plan I now propose be possible or not. The extent of the power which steam is capable of exerting, the size of the boiler and cylinders, and the whole weight and structure of the machine necessary to produce a given power, the force of attraction necessary to draw a given load at any given velocity, and to overcome a certain inclination or ascent in the road. The extent of the resistance produced by the friction of the axles, and the resistance produced by the rolling of the wheels. The resistance of gravitation in ascending inclined plains, and that of the resistance of the air. The resistance on different kinds of rails, whether made of wood, stone, or iron; and also that on common pavements and McAdamized and gravel roads, are all subjects at this day perfectly understood, and require no practical experiments to test the truth of that which has been tested daily for many years past, and is now in hourly use, and great practical utility. The only question which I found it necessary to determine by practical experiments, was, whether the resistance produced by the *rolling* of the broad cylindrical wheels over the common prairie, would be so great as to be beyond the power of steam to overcome, for practical and useful purposes. No experiments on this point had ever before been made, nor am I aware that such a thing ever entered the mind of any man before I thought of it. In order to show more clearly the practicability of my plan, it will be necessary to know what has been done, and is capable of being done, with steam works on rail roads and McAdamized roads, and then compare them with what I propose to do on the natural prairie, without any expense whatever in constructing any road.

When steam engines first began to be used, it was common to estimate the power of an engine by comparing it with horse power, that being the best mode of conveying to others the idea of the extent of the power of the engine. This, however, was by no means a very accurate mode of calculating the power of a steam engine. The horse power varies very much in point of fact, and still more in the various modes of estimating what a horse power was. The best mode of calculating the power of any moving matter is by pounds weight, gravity being at all times the same, any given weight suspended by a cord in a perpendicular direction, will at all times exert a specific power in drawing after it whatever may obstruct its passage to the earth. If, therefore, you take any given weight and suspend it to one end of a cord which passes over a pulley, the other end of the cord being attached to a carriage rolling on a horizontal plane, the weight falling in a perpendicular line, will give the true power necessary to draw the carriage along the plane in any given velocity. Whenever we speak of a horse power at this day as applicable to steam engines, it is agreed to mean that power which will draw 40 lbs. weight up over a pulley at the rate of ten miles an hour, 80 lbs. at five miles an hour, or 160 lbs. at the rate of two miles and a half an hour. The power necessary to draw a ton weight, or two thousand pounds ten miles an hour along a well made, level, straight railroad, is found to be ten pounds over a pulley of this resistance; 7½ lbs. is found to be produced by the friction of the axles, and 2½ lbs. by the rolling of the wheels. The resistance of the atmosphere being generally small, and not estimated at that velocity. On a curve of any railroad which would form a circle of 800 feet diameter, the resistance is 50 per cent. greater, or 15 lbs. to the ton, and so in proportion, around a curve of greater or less magnitude. The shorter the curve the greater the resistance, and the nearer the road approaches to a straight line, the less the resistance. The increased resistance in ascending an inclined plane on a railroad is very great, owing to the great weight they generally draw on a level road, the gravitation being always in proportion to the whole weight, in ascending planes, whereas on a level it does not operate at all. It is however ascertained that a locomotive engine can be made to ascend an inclined plane rising one foot in four, at the rate of eight to ten miles an hour, carrying its own weight only. On a straight level railroad, an engine will draw after it about forty times its own weight. On a straight level McAdamized road an engine will only draw, according to some experiments, about 1-10th of this amount, or four times its own weight, while other experiments prove that it will draw 1-7th, or nearly six times its own weight.

Supposing the resistance arising from the friction of the axles to be the same on a McAdamized road as on a rail road, that is 7½ pounds to the ton, then it follows the increased resistance on the McAdamized road, arises entirely from the rolling of the wheels. This is in consequence of the wheels constantly sinking more or less in the ground, and having constantly to overcome the irregularities of the road. The resistance thus produced, including the friction of the axles, is thus estimated on the different kind of roads in England:

1. On a well made pavement, the resistance is	33	lbs. per ton
2. On a broken stone surface on old flint road,	65	" " "
3. On a gravel road,	147	" " "
4. On a broken stone road on a rough pavement foundation,	46	" " "
Average,	72¾	" " "

By comparing the foregoing with experiments which I have made, it will be seen that the lowest rate of resistance on a smooth pavement is greater than that of the broad wheel on common, soft, but dry earth, while the average resistance on all kinds of roads, including the gravel road, is about 7 times as great as that on a railroad, as before stated. The highest resistance of the broad wheel on a swamp is 88 pounds, so that the average is less than the average of the common roads in England where these experiments were made.

It follows, that if an engine can be made to carry forty times its own weight on a level rail road, estimating the resistance to

be 10 pounds to the ton, then my broad wheel coach can be made to carry 8 times its own weight, estimating the average resistance at 50 pounds to the ton.

But as none of the roads now in use are either level or straight, and most of them have many curves of less than a radius of 400 feet, and consequently producing an increased resistance of more than 50 per cent. without the inclined planes, it follows that the estimate above is quite too large.

But without regarding the proportional advantages of a rail road, and even supposing it to be ten times as great as the common road, yet it is demonstrated by the foregoing experiments that *an engine can be made to run over the common dry Prairie at the rate of ten miles an hour, drawing after it eight times its own weight.*

It is a well known fact that steam coaches, running on common roads, have been in use for many years in England, and the *practicability* of using them on the common roads in that country, has been tested beyond the possibility of a doubt. Mr. Hancock, a celebrated English engineer, as late as 1837, says: "Years of practice has now put all doubts of the economy, safety, and superiority of steam travelling on common roads at rest, when compared with horse travelling; though the reverse has been disseminated rather widely of late, by parties who do not desire that this branch of improvement should prosper against their own interest." Mr. LeCount, who wrote an excellent work on Rail Roads and locomotive engines, published as late as 1839, says: "The attempt which has been made by many ingenious gentlemen, to introduce steam coaches on common roads, we are certain will, at no very distant period of time, be successful."

Mr. Gordon says in his work on rail roads:

"It is certainly very difficult to account for the long delay in the adaptation of a steam carriage to a common turnpike road. Engineers seem to have been shut up to the belief that it was impossible. Their very limited knowledge of the nature of a locomotive engine and its operations, precluded speculation as to this more extensive application, in much the same way as the limited knowledge of steamboats in 1814 retarded, for so long a time, steam navigation on the ocean.

On a railway, the slight adhesion of the surface of the wheels to the rail was inadequate to propel the locomotive engine up any considerable ascent. This difficulty seems to have engendered the notion,—a notion scarcely yet removed, though proved to be absurd by a host of facts,—that a steam-carriage could never ascend a hill of even moderate acclivity upon the common road. But the fact outlives their reasonings, and the possibility of the thing proved *experimentally*, rests upon a plain practically demonstrated basis."

The committee of the House of Commons, in England, who were instructed by a resolution of that body in 1831, "to enquire into the present state and future prospect of land carriage by means of wheeled vehicles propelled by steam on common roads, and to report upon the probable utility which the public may derive therefrom," went into a full investigation of the subject, and came to the conclusion and reported "that the substitution of inanimate for animal power in draft on the common roads, is one of the most important improvements in the means of internal communication ever introduced. Its practicability they consider as having been fully established. Its general adoption will take place, more or less rapidly in proportion as the attention of scientific men shall be drawn by public encouragement to further improvements. * * *

"It appears from the evidence that the first extensive trial of steam as an agent in draft on the common roads, was that by Mr. Gurney, in 1829, who travelled from London to Bath and back on his steam-carriage. He states that he performed the trips, eighty-four miles, from Melksham to Cranford bridge in ten hours, including stoppages.

"The committee have also examined Messrs. Summers, Ogle, Hancock and Stone, whose steam carriages have been in daily use for some months past on common roads.

* * * * * * *

"When we consider that these trials have been made under the most unfavorable circumstances—at great expense—in total uncertainty—without any of those guides which experience has given to other branches of engineering—that those engaged in making them, are persons looking solely to their own interests, and not theorists, attempting the perfection of ingenious models, when these men are convinced, after long experience, that they are introducing such a mode of conveyance, as shall tempt the public by its superior advantages from the use of the admirable lines of coaches which have been generally established, it surely cannot be contended, that the introduction of steam-carriages on common roads is, as yet, an uncertain experiment, unworthy of legislative attention.

"Besides the carriages already described, Mr. Gurney has been informed that from twenty to forty others are being built by different persons, all of which has been occasioned by his decided journey in 1829.

"The committee have great pleasure in drawing the attention of the House to the evidence of Mr. Farey. His opinions are the more valuable from his uniting in so great a degree, scientific knowledge to a practical acquaintance with the subject under consideration. He states that he has no doubt whatever, but that a steady perseverance in such trials, will lead to the adoption of steam-carriages, and that what has been done, proves to his satisfaction, the practicability of impelling stage coaches by steam on good common roads, in tolerably level parts of the country, without horses, at a speed of eight or ten miles an hour.

"Mr. Gurney states that he has kept up steadily, the rate of twelve miles per hour, and that the extreme rate at which he has run is between twenty and thirty miles per hour. Mr. Hancock reckons that with his carriage, he could keep up a speed of ten miles per hour without injury to the machine. Mr. Ogle states that his experimental carriage went from London to Southampton, in some places, at a velocity of from thirty to thirty-five miles per hour; that they have ascended hills, rising one in six, at sixteen and a half miles per hour, laden with people. That this engine is capable of carrying three tons weight in addition to its own. Mr. Summers adds, that they have travelled in the carriage at the rate of fifteen miles per hour, with nineteen persons in the carriage, up a hill of one foot in twelve. That he has continued for four hours and a half, to travel at the rate of thirty miles per hour. That he has found no difficulty in travelling over the worst and most hilly roads. Mr. James Stone states that, thirty-six persons have been carried in one steam-carriage; that the engine drew five times its own weight, at the rate of from five to six miles per hour, partly up an inclination.

"The several witnesses have estimated the probable saving of expense to the public, at from one half to two-thirds. Mr. Farey, gives as his opinion, that steam coaches will very soon be run for one third of the cost of the present stage coaches."

Perhaps, one of the principal advantages resulting from the use of steam, is that it may be employed as cheaply at a quick as at a slow rate; while horse labor becomes more and more expensive as the speed is increased. In all cases, horses lose power of draft in a much greater proportion than they gain speed, and hence the work they do, becomes more expensive as they go quicker.

On a steam coach, either upon a rail road or a common road, the resistance is in direct proportion for all velocities, while the proportion increases with every increase of velocity in the use of horse power. The same principle applies to vessels at sea, on rivers, or on canals. The resistance to be overcome

increases as the square of the velocity, so that to double the speed, the power must be multiplied by four and to trible it, the power must be multiplied by nine, &c.

The following table will show the additional and increasing power on a rail road and on a canal of a car or a boat weighing 15 tons:

Miles per hour.	Boat on a canal. Power in pounds.	Rail road car. Power in pounds.
2	50	150
4	200	153
6	450	155
8	800	159
12	1800	170
16	3200	187
20	5000	208

After going on through a detailed report on all the subjects connected with steam coaches on common roads, the committee concluded by saying:

"Sufficient evidence has been adduced to convince your committee:

1st. That carriages can be propelled by steam on common roads, at an average rate of ten miles per hour.

2d. That at this rate they have conveyed upwards of fourteen passengers.

3d. That their weight, including engine, fuel, water, and attendants, may be under three tons.

4th. That they can ascend and descend hills of considerable inclination with facility and safety.

5th. That they are perfectly safe for passengers.

6th. That they are not (and need not be if properly constructed) nuisances to the public.

7th. That they will become a speedier and cheaper mode of conveyance than carriages drawn by horses.

8th. That rates of toll have been imposed on steam carriages which would prohibit their being run on several lines of roads were such charges permitted to remain unaltered."

This last has been the main cause of keeping back the use of steam carriages on common roads:

"In February, 1831, Mr. Gurney having completed three steam carriages for Sir Charles Dance, that gentleman commenced running one regularly on the road betwixt Gloucester and Cheltenham, and continued so to do constantly and successfully for months, until he (disgusted with the opposition) withdrew his coaches. So strong did the opposition press upon steam carriages, that Mr. Gurney found it necessary to petition the House of Commons. Several bills had hastily been passed through Parliament, laying prohibitory tolls on steam carriages, in some cases amounting even to 2*l.* for each time the steamer would pass.

While these prohibitory tolls were levied on steam coaches on common roads, the rail roads were entirely exempt, not only from the tolls but also from the government duties, which were very great.

Mr. Thomas Graham, who wrote a treatise on Internal Intercourse, published in 1834, says, page 151.

"Already the effect of this measure (the tax on coaches going by common roads,) has been to withdraw and nearly put a stop to the laying out of capital in the improvement of turnpike roads."

At page 122, "The entire costs per mile of travelling in many parts of France, does not amount to the government duties in Britain." Page 109, "On a turnpike road, 8 coaches running 30 miles, carrying 18 passengers each, will in nine (9) trips each way, pay a duty of £29,317 10s. The same number of coaches, carrying the same number of passengers and making the same number of trips, pay a passenger duty of £5,711 3s. 3d. Difference against road coaches, £23,406 6s. 9d.

TABLE. Page 107.

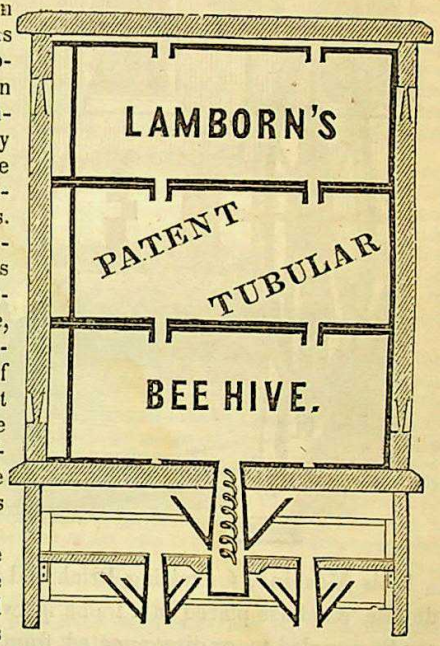
	No. of Passengers	Duty S. D.	No. of Pass's	Duty S. D.	No. of Pass's	Duty S. D.	No. of Pass's	Duty. S. D.
Turnpike road	18	11 3	9	11 3	6	11 3	0	11 3½
Rail Road	18	5 7½	9	2 9¼	6	1 10½	0	00 0

"The turnpike road, Government duties, independent of tolls to the companies is (1834) about £1,200,000 per annum. Page 90. "The turnpike road coach masters boldly assert, that they have been put down, not by fair competition, but by a most partial taxation from which the rail road companies are exempt.

"It is a matter of great regret, that any interested individuals should have it in their power to delay a national benefit by their opposition. A pamphlet has been published by Mr. Gurney, detailing some of the difficulties he had to encounter. The proceedings, which interested persons took, against the invention, are described in a postscript to that pamphlet; it is here quoted in the words of Sir Charles Dance to Mr. Gurney.

LAMBORN'S PATENT TUBULAR BEE HIVE,

ON NATURAL PRINCIPLES, IS NOW OFFERED TO THE PUBLIC.



It is a suspension hive, so constructed as to arrest all depredatory insects and vermin which so commonly intrude upon and annoy these industrious little communites in the common constructed hives.

In the present construction the bee enters the hive through an inverted truncated cone, and the cone being filled with any kind of fluid is sure to arrest the ant or any of the various insects that often commit destructive incursions on the hives now in general use.

In the main entrance tube to the body of the hive is fixed a spiral wire which facilitates the passing in and out of the bees, and on cool mornings and evenings enables them to suspend in solid column, which insures to them a natural heat whilst on guard. The body of the hive is so arranged that the Aparian can remove any part or parts of the hive at pleasure, without destroying a single bee or leaving the combs in a mutilated or torn condition.

All creatures having more or less care for the security of their young, the bee during this period select the heart or middle boxes of the hive. The Aparian on this occasion, by strict attention may remove these boxes at the proper season, and avoid the hitherto troublesome task of hiving them in the old way.

The *Patent Tubular Hive* has numerous decided advantages as regards the security and protection of the bee in propagation and operation, over any ever before offered to the public.

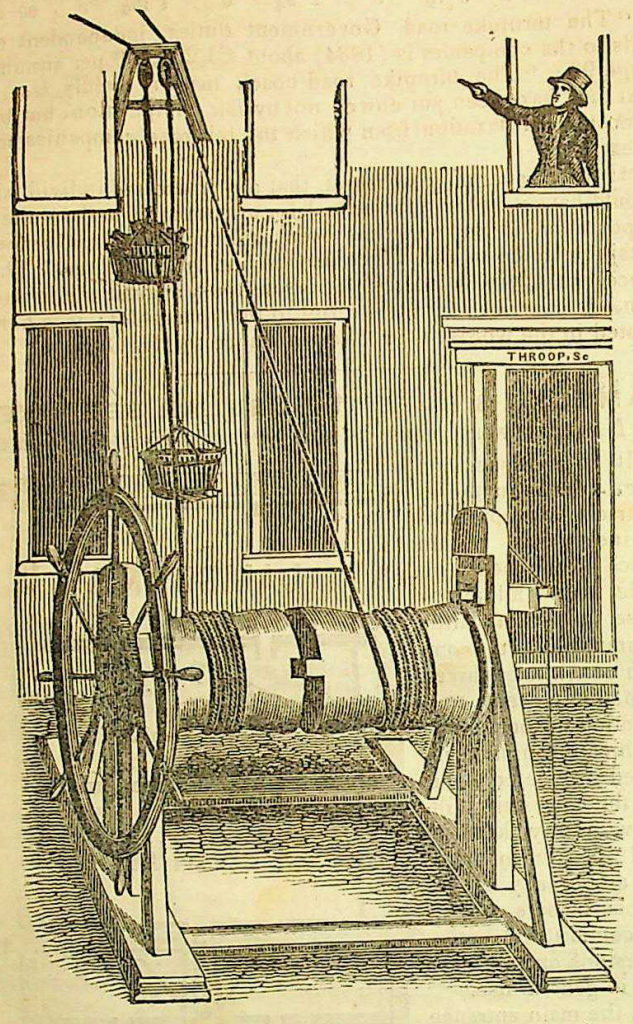
The Patentee has in this constructed hive been yielded 150 pounds of honey in five weeks from the first entrance of the bees therein; and he has sold this season 80 pounds of honey, being the product of a single hive; and furthermore, will risk his whole interest in this concern, that ten hives of Bees, if properly managed, will nett one hundred dollars per year.

ISRAEL LAMBORN, Patentee,
Marshallton, Chester County, Pa.

IMPROVED WINDLASS,

FOR RAISING WEIGHTS, &c. BY SABIN & HOWE.

Patented September 9th, 1846.



This Machine, for raising Brick and Mortar, consists of a double windlass placed in a frame in two parts, one of which can be coupled to, or disconnected from the other at pleasure. On said windlass two ropes are wound one on each, in contrary directions, so that when one rope is wound up by turning the windlass the other shall be unwound by disconnecting the two windlasses, the ropes can be arranged as to raise the boxes or weights attached to the end thereof, to any height, these ropes pass up over the double derrick at the top of the house, thence descend to the ground.

Arranged for raising weights in store houses the wheel and windlass stands in the upper story of the building with forked Irons drove in the rim of the wheel turned with an endless rope, (after the form now used,) the operator can at pleasure lengthen or shorten the ropes for any story in the building, by means of a rope attached to the slides, as represented in the cut, the same windlass is used for conveying gravel or clay out of wells and for hoisting goods out of vessels, &c., with double velocity than can be done any other way at the same expense.

A SERIES OF LETTERS,

From JOHN A. BRYAN, *late Charge d'Affaires of the United States to Peru, on the connexion of the Atlantic and Pacific Oceans*

PANAMA, FEBRUARY 14, 1845.

DEAR SIR:—This is a point long known as one of great commercial attraction. It is the terminus of the contemplated pass way from the Atlantic to the Pacific Ocean. Nature has made it an important position. The geography of the world has left it without a prospective rival at this Isthmus; and, being compelled on my route to Lima, to await the arrival of one of our ships of war to convey me to my destination, I have felt that I could, in no other way, so profitably employ the leisure of the interval, as in the investigation of this very important subject. Hasty as my examination has necessarily been, the information I have collected is grounded upon facts essential to be thoroughly understood, and vital to the interests of our national trade.

Different kingdoms and governments had so long theorized upon the subject of a canal or rail-road between the two oceans, that it had almost ceased to enlist the public attention, until a renewed ardor seemed to be infused into the question by the recent movements of the popular mind in Europe. For centuries, this has been the theme of public discussion on the other side of the Atlantic; and some among the most scientific and distinguished statesmen across the water have made it a leading topic of comment and investigation, not only in the learned reviews, but in the most able commercial publications that have so long shed a lustre upon modern enterprise and improvement in the circles of transatlantic intelligence.

It will be quite burdensome to the reader, and prove an unprofitable use of the several examinations, reports, and estimates connected with this great question, to attempt, at least in the short space of two or three letters, which I propose to write on this subject, to present all the figured calculations employed to demonstrate the practicability of the projects suggested. This would only weary the mind by overloading it with a mass of self-evident testimony upon a point on which there seems to be little or no diversity of opinion. All now freely admit the entire practicability of such a connexion. Enough is already known to convince the most sceptical, that no insurmountable barriers stand in the way of its accomplishment. The objections have, all of them, as I apprehend, a different foundation—one which, it is indeed painful to contemplate, and which should, if possible to have been avoided, never have had an existence. National rivalry; the want of concession and compromise; the entire absence of all concert of action; the distance of the Isthmus from all the great maritime Powers, and the consequent expense, incident to so great an undertaking, have hitherto quite unfortunately permitted an unparalleled work to slumber on the dull page of an engineer's or commissioner's report, which, once accomplished, would spread a total eclipse upon every thing of its kind in the history of the world. Such an enterprise should be the work of nations. Every quarter of the globe is interested in its execution Rivalry should have no part or lot in the matter. The connexion of the two oceans should in truth be made a common object for the benefit of mankind. That great purpose would be defeated, should it pass, as I greatly fear it will do, into the hands of speculators; but the God of Nature intended it for no such monopoly. *The broad ocean* is the common high-way for the commerce of the world. No compromise is required for its free enjoyment; the flag of every nation finds protection upon its waves; the products of every clime ride in security upon its bosom; and latitude and longitude are given to every sail that whitens its surface.

All this, and more, is indeed true in the abstract; but, after all, what is the use to moralize? Why urge what *ought to be done*, when such opposing interests are brought in conflict? *They* hold supreme control in all such matters. This has been fully shown by the course hitherto adopted, and I do not know that we have much reason to expect better things for the future.

The distance that separates the Atlantic from the Pacific, at this Isthmus, is so very trifling, that the proposed union is one of the most palpably natural events within the whole circle of hydraulic operations; and yet, how strange the fact, that a project, so rich in promise, so deeply interesting, and so vitally important to the commerce and trade of nations, should be known only upon the maps and charts of the mere agents of Government.

The Congress of Nations once sat in solemn conclave here. The grand aim of that Convention was understood to be to fix upon some mutually advantageous commercial regulations, and to promote union and concert in this vast undertaking. But its acts and doings seem to be little known By many, that Convention was considered a mere chimera. However that might be, certain it is, that impenetrable darkness covers its deliberations at this point.

The only memorial of its result here, at the very seat of its sittings, which weeks of persevering inquiry alone have enabled me to discover, (and that indeed a sad one,) I found engraved upon the tomb-stones of two young men from England, one aged eighteen and the other twenty-one, secretaries to the British representation in that Congress, who died here, June and July, 1826, of the prevailing fever of the country, and within a few weeks after their arrival. Yet, *Panama* is deemed uncommonly healthy, and free from all those fatal maladies which are so lamentably incident to some of the less favored ports upon this coast.

Whatever the deliberations of that body, certainly nothing of interest has ever followed its doings, and we have to look to subsequent events for all that has ever been made to see the light upon this subject.

The difficulty of procuring accurate intelligence of some of the early movements upon this question, has drawn my attention more directly to those of our own land and nation. We have ever engaged, as a people, in a warmth of interest and feeling natural to our position, in this vitally important discussion. Though suffered to slumber, it has never been permitted to die. It is now, as it has ever been in the United States, a matter of earnest and anxious inquiry among all of our leading statesmen and men of science, many of whom have been most ardent and untiring in their investigations, and to whom the commercial world is, at this moment, deeply indebted for the embodied information they have left upon record. *The American press*, too, that great engine of public opinion, that mighty prop and pillar of freedom, has never been behind those of France and England, in a frank and manly discussion of this proposition. It is true, that those monarchies, each of which, has a string of rich and productive islands in the Indies, and the former in the Pacific, have for centuries been looking with eagle eyes to this Isthmus; and the latter Power in particular, if full credence may be given to proceedings whose object cannot well be misapprehended, has been eagerly watching every ruffling of a leaf from every quarter of the globe, having the least squinting towards the contemplated connexion of the two seas. A condensed history of the steps taken by different nations and Governments, in reference to this project, will, at a glance, show the position in which this matter now stands; and this will be brought within a very narrow compass. Tiresome and prolix essays are ill suited to such an investigation; they serve only to clog and embarrass inquiry; while a brief synopsis, embodying all the material facts, can be made to reach every reader, and every private study. This I shall endeavor to effect; for a full and minute description of all the correspondence, surveys and estimates, commercial, statistical and hydraulic, would crowd a volume of a thousand pages. When properly condensed, this is its brief history; a part of which will be made to follow in subsequent communications.

The precise distance from ocean to ocean, across the Isthmus of Panama, in a direct line, is thirty-nine miles. By the various windings of the streams and the hills, this distance must necessarily be considerably increased. After leaving the Chagres river, which is a beautiful stream, rolling majestically from the mountains, winding, deep and clear, some of the elevations are steep and rugged, but neither insurmountable as obstacles, nor very difficult, in the main, of being successfully overcome. All the surveys and estimates sufficiently demonstrate this truth, sustained and defended as it is, by the deliberate judgments of the many able, scientific men who have examined the subject.

The American Consul at this port, (WM. NELSON, Esq., who, I take occasion to say, is a very capable, efficient and valuable officer,) has referred me to some statistical facts, of a local character, which it may be well to present in this place. They will serve to illustrate, in a small degree, some of the points standing closely associated with the idea of this great contemplated improvement.

The Isthmus of Panama is composed of two distinct provinces, each of which is under the immediate jurisdiction of New Grenada. That of Panama, contains about seventy-five thousand inhabitants, and that of Veraguas, (which, in the original Spanish tongue, signifies *two seas*,) nearly or quite forty-five thousand. Of this number, only about one thousand continue to be slaves.

The white population is quite limited. Nineteen twentieths of the whole people of the two provinces are negroes, indians and creoles.

The importations amount, annually, to about three hundred thousand dollars. These consist principally of British dry goods from Jamaica, which are borne upon the backs of mules over the Isthmus, from Cruses and Gorgona, the head of boat navigation upon the Chagres river.

The annual exports are also quite limited, and consist, mainly, of hides, sarsaparilla, pearls, gold dust and doubloons.

The principal productions of the Isthmus are rice, Indian corn, plantains, yams, sugar, &c., and these articles are those of general consumption among the inhabitants, and nearly the only ones of family use.

Cotton, coffee and cocoa are also produced, but not in sufficient quantities for exportation.

Gold, silver and copper mines abound in almost every part of the country; and coal beds have recently been discovered in the Province of Veraguas; but how extensive or promising, in quantity or quality, is not yet fully known. It is, however, deemed abundant and ample for the supply of a large extent of country around, and no reasonble doubt remains of the existence of similar inexhaustible fountains of this useful material in the mountains of the two provinces, yet to be developed. Industry and research will bring them to light; and time, it is confidently believed, will yet unfold undiscovered sources of mineral wealth in this region, scarcely excelled by the rich and productive mines of Peru and Mexico.

This town (Panama) is the capital of this province. It was once (in the *hey-day* of its prosperity and success) a place of wealth and importance, and the great centre point for the millions of the precious metals that annually found their way to the Atlantic, over a low chain of the hills of the Cordilleras. It now contains a population of about seven thousand souls, principally colored. It is a walled town, and it was early enacted by the public authorities here, that no dwelling should be erected out-side of the breatwork. This prohibition, however, has long been dispensed with, and at this particular period, about an equal number and proportion of the inhabitants live without the walls. But such is the present lamentable depression of public spirit here, and such has been the actual decline of business for the last quarter of a century, that, to a fresh sojourner from our own prosperous land, coming from our blooming fields, and flourishing cities and towns, it has certainly a very uninviting aspect, and one that cannot well be contemplated without pain. And yet, one prominent fact must be admitted to their credit, and that is, that entire good order seems to reign among the people, and evidences exist, every where around you, in town or country, of that characteristic ease and contentment, which is, after all, in a great degree, the true fountain of all real enjoyment.

I have made this brief diversion from the main subject under consideration, in order to have properly incorporated in my letter, such of the leading statistics of this Isthmus, as seemed to me somewhat essential to a full elucidation of this projected enterprise.

The Netherlands were the first great nation that took early steps to ascertain the practicability of the proposed connexion of the two oceans. That country spent large sums of money in its investigation; but years of labor and toil yielded nothing but mortification and disappointment.

General VERVEER, (as was fully communicated to our Government, by Mr. SAVAGE, then acting Consul of the United States at Guatemala,) clothed with full powers from his King, arrived in that city in March, 1829. That beautiful country was then in a distracted state of civil commotion. The troops of St. Salvador and Honduras flooded the republic, and a devastating revolution, dealing desolation and death along its path, soon placed the devoted city of Guatemala in the power of the invading hero, MORAZAN.

A painful suspense to General VERVEER, followed this disastrous result; and it was not until a new order of things prevailed, that he opened the subject of his mission to the ruling powers. Commissioners were finally appointed, and negotiations were commenced. The representative of the Netherlands sought the adoption of a canal route through the agency of a company of Hollanders, by way of St. Juan and Nicaragua. Success in a measure followed his efforts. A decree of the Congress stipulated certain conditions, as the basis of the arrangement.

The articles embracing the minutia of this agreement are too numerous for the limits I have allowed myself in this communication; nor are they at all requisite, in detail, to a definite understanding of it. Some among them, seem quite essential, however, to a general knowledge of this subject; and in the brief form in which I propose to present it, a few lines will encompass them. They were minutely communicated to the Congress of the United States, under a resolution of the Senate of 1835, requesting the President to consider the expediency of opening negotiations with other nations in reference to this grand enterprise.

It was particularly provided by the Government of the Republic, that the canal should be free to all nations. That no Government, in this particular, should enjoy advantages over another. That the consent of the Government of Guatemala should be first obtained for the passage of all ships through the canal; and such privilege to be allowed to no flag at war with the Republic or any other nation. The Government was to furnish, at its own expense, the free use of the soil over which the canal was to be made; the company to supply the plan of the canal, which was required to be upon the most extensive possible scale. The work was to pay the capital and interest out of its own revenues; the revenues, also, to pay for all repairs and preservation. The direction of the business to remain in the hands of the undertakers, and all foreigners employed on the work to be deemed guests of the nation, and free from all contributions to the same. They were likewise to be exempt, not only from military service, but to be under the immediate protection of the Government.

A free commercial town was to be established in the vicinity of the canal, which should enjoy perfect freedom of religious toleration, entire freedom of commerce, and to have its own municipal regulations. The town and canal were to remain under the direct sovereignty of the Republic, and the whole project to be commended to the special protection of all the maritime Powers of the world.

By subsequent enactment of the Congress of the Government, it was further decreed, that the union of the Pacific and Atalntic, by a canal across the Isthmus, was fixed and irrevocable. The decree alleged, that the great work was undertaken with the most liberal and philanthropic views, and with the full persuasion that its completion would augment the happiness of every nation, by advancing navigation, commerce and industry, as well as the arts, sciences and civilization; and certain safeguards were required, as indispensably requisite to ensure its advancement and success. The slave-trade through the canal was positively inhibited, and every slave made free who should thus enter it. Also, the act of traffricking in them, was, under the prescribed regulations, made positive PIRACY.

Other important guards and securities were thrown into the decree, such as defining and designating the track and dimensions of the canal, and pointing out the mode of its administration—controllership of the capital to be employed, the method for raising it, the investment of the funds, &c. and the form and manner, and time of rendering accounts. It was further provided, that proper guarantees be made as security for the interest, and the final extinguishment of the debt to be contracted for its construction; for ceding the grounds, lakes, rivers, materials, &c., for the construction,

preservation and proper management of the great work. A tariff of transit duties and tolls was also provided; and, indeed, all the necessary provisos and exactions made, which seemed essential to protect the rights and interests of the Government, and of the company to whom the privilege was extended. The rights of those employed, the defence and protection of the canal, its pilotage in the harbors, inspection and police, and all other safe-guards to prevent injury or embarrassment, and to insure a faithful execution of the contract, were specially provided for; and the whole based upon a loan to be obtained from Holland of THREE MILLIONS OF DOLLARS. But, before any definite action was ever had upon the subject, in pursuance of these proceedings, disturbances of a serious nature (as was communicated by Mr. SAVAGE, our Consul at Guatemala) broke out in Holland, and the whole arrangement failed of its full consummation. This was during the latter end of the year 1830, and the expressive language used by Mr. SAVAGE, in alluding to this unexpected result, that "all concur, and every one seems tacitly to look forward to the United States for the completion of this project," is truly indicative of the prevalent feeling then existing in Guatemala, and which ever has existed among that people, in favor of our Government and country. Mr. SAVAGE further very emphatically adds: "The people say, that the 'United States, identified in her institutions with this Government, ought 'to have the preference."

This opinion is fully sustained by Mr. CANAZ, Envoy Extraordinary to the United States from Guatemala, in his correspondence with Mr. CLAY, then Secretary of State, in 1835. In that correspondence, the deportment and conduct of Mr. CANAZ, was that of a high-minded and honorable man, an enlightened patriot, and an able and distinguished statesman. There is certainly very great force in his views, as embodied in his note. While recapitulating the many embarrassments, incident to the infant freedom of his own land, and the difficulties of that assurance of pecuniary aid and co-operation so desirable, (which he deeply regretted to be unable to tender,) he most beautifully observes: "This project, which, viewed 'with respect to the possibility of its execution, does not exceed ordinary 'bounds, is, for the importance of the effect it ought to produce upon the 'general prosperity of the two worlds, the most vast which could ever be 'conceived; and, although the omission of it ought to fill with shame the 'Government which previously caused it, its execution will be a most 'glorious act for that which undertakes and brings it to the desired termi-'nation. I am certain that my Government, when placed in better cir-'cumstances than the present, would not consent to part with the least 'portion of this distinguished honor; but it is, in the first moments of its 'existence, occupied simultaneously in forming the institutions which 'must confirm its political government, and the quantity of force which is 'necessary to secure its preservation, and can neither distract its attention 'from these objects, nor employ its resources, which are still scanty, on 'those which are not of primary necessity. But as its sentiments do not 'permit meanness, and its sincere desires are those of utility, it does not 'wish to retard longer the inestimable benefits which must be produced 'to the world by means of this great enterprise; and it has been resolved 'to consent to a foreign co-operation to render it effectual.

"I ought to mention, sir, as the representative of the Government of the 'Centre, that nothing would be more grateful to it than that this co-operation 'should be owing to your generous nation, whose noble conduct has been 'a model and a protection to all the Americas; and that on these conside-'rations, it will be highly satisfactory to have it a participator, not only in 'the merit of the enterprise, but in the great advantages which that canal 'communication must produce, by means of a treaty, which may per-'petually secure the possession of it to the two nations. By the data 'which at present exists, there ought to be no doubt of the possibility of 'the work in the terms shown by the plan which I have the honor of send-'ing to you herewith."

This very acceptable response to the opening note of Mr. CLAY was as politely answered by that eloquent and eminent American statesman, in which, among other things, he takes occasion to remark: "I am instruc-'ted by the President to make known to you the very great sensibility 'with which he received the expression of sentiments of consideration 'and friendship towards the United States, which are entertained by the 'Government of the Republic of the Centre of America, and at the same 'time to assure you that they are most cordially reciprocated."

Mr. CLAY, in further allusion to this great project, then in the inceptive stages of public inquiry and investigation, goes on to observe: "The 'confidence of your Government in that of the United States, is strongly 'manifested by the highly important proposition which your note commu-'nicates. That proposition is, that the United States shall co-operate with 'the Republic of the Centre, in promoting the opening of a canal through 'the province of Nicaragua, to unite the Atlantic ocean to that of the Pa-'cific; and that, by means of a treaty, the advantages of that canal may 'be perpetually secured to the two nations. The idea has been long con-'ceived of uniting those two seas by a canal navigation. The execution 'of it will form a great epoch in the commercial affairs of the world. 'Various lines for the proposed canal have been suggested, and have di-'vided public opinion. The evidence tending to show the superiority of 'the advantages of that which would traverse the province of Nicaragua 'seems to have nearly settled the question in favor of that route. Still, 'on a project of such vast magnitude, it is necessary to proceed with the 'greatest caution. A false step, taken in the first movement, might lead 'to most mischievous consequences. The President has, therefore, deter-'mined to instruct the Charge d'Affaires of the United States, whom he 'has just appointed, (and who will shortly proceed to the Republic of the 'Centre,) to investigate, with the greatest care, the facilities which the 'route through the province of Nicaragua offers, and to remit the infor-'mation which he may acquire to the United States. Should it confirm 'the preference which it is believed that route possesses, it will then be 'necessary to consult Congress, as to the nature and extent of the opera-'tion which shall be given towards the completion of the great work. 'The Charge d'Affaires of the United States will be specially directed to 'assure your Government of the deep interest which is taken by that of 'the United States, in the execution of an undertaking which is so highly 'calculated to diffuse an extensive influence on the affairs of mankind, 'and to express to it, also, the acknowledgments which are justly due to 'the friendly overture of which you have been the organ."

Under date of the 24th November, of the same year, Mr. WILLIAMS, the then Charge d'Affaires to Guatemala, alluded to in the letter of Mr. CLAY, writes thus to the Department of State: "On my journey, at St. 'Vincente, eighty six leagues east southeast from this city, I met with 'Mr. CANAZ. He returned from the United States by the river St. John 'and Lake Nicaragua. He entertains no doubt of the practicability of 'the contemplated canal."

In the communication of Mr. CLAY to Mr. WILLIAMS, introducing this interesting subject, as standing immediately connected with the negotiations with Mr. CANAZ, before alluded to, he observes: that "the note 'addressed to the Department by the Minister of the Republic of the 'Centre, afforded a new and highly interesting proof of the friendly sen-'timents entertained by his Government towards the United States."

In that note he adds: "After calling the attention of the Government 'to the important object of uniting the Atlantic and Pacific oceans, by a 'canal navigation through the province of Nicaragua, by the direction of 'his Government, Mr. CANAZ offers to that of the United States to share 'in that great interprize, and, by means of a treaty, perpetually to secure 'the advantages of it to the two nations. To that note, an answer was 'transmitted."

"It will at once occur to you," continues Mr. CLAY, "to ascertain if 'surveys have been made of the proposed route of the canal, and if entire 'confidence may be placed in their accuracy." And he proceeds very pertinently to ask, "what is its length? what the nature of the country, 'and the ground through which it is to pass? Can the supply of water 'for feeders be drawn from the Lake Nicaragua, or other adequate sources? 'In short, what facilities do the country and the state of its population af-'ford for making the canal, and what are the estimates of its cost? It is 'not intended that you should inspire the Government of the Republic of 'Guatemala, with any confident expectation that the United States will 'contribute, by pecuniary or other means, to the execution of the work, 'because it is not yet known what views Congress might take of it. What 'the President desires is, to be put in possession of such full information 'as will serve to guide the judgment of the constituted authorities of the 'United States in determining, in regard to it, what belong to their inte-'rest and duties."

These cursory views pretty faithfully indicate the state of public feeling prevailing in the United States upon this subject at the time of these negotiations; and very fairly illustrate the precaution usually employed by all of our public functionaries, when engaged in an enterprise, having for its object, the interest and welfare of a great and growing nation.

But Mr. CLAY stood not alone in this grand movement. He was backed by powerful intellects, and by men, having with them, the unbounded confidence of the mass of the American people. General JACKSON, the venerable sage of the Hermitage, on coming into the administration, is understood to have given this inquiry his early attention, and his warm and hearty sanction. And both Mr. VAN BUREN and Mr. FORSYTH, eminent and distinguished in the councils of their country, when respectively at the head of the Department of State, took an active interest in the preliminary steps for its thorough investigation. Mr. LIVINGSTON, of Louisiana, too, Secretary of State, under General JACKSON, whose learning and abilities shed an enduring lustre upon every branch of the public service to which he was ever called, in his correspondence with Mr. JEFFERS, manifests the deepest solicitude in behalf of this projected measure. He sought to learn the actual state of the proceedings of the Congress of Guatemala, and the precise and definite principles of the arrangement made between that Republic and the Dutch company, heretofore alluded to. He was particularly solicitous to understand the real *basis* of the agreement with the Minister of the Netherlands, and whether the copies of the several articles of the contract were or were not as stated by Mr. SAVAGE, (who did not, in some particulars, pretend to any definite knowledge of his own, on the matter communicated to the Government.)

In one of his letters to Mr. JEFFERS, dated 20th of July, 1831, Mr. LIVINGSTON says: "The ports, inlets, rivers, and other facilities for ex-'ternal commerce on both seas, are not known or laid down on any charts 'with sufficient accuracy. It will be useful, if any surveys have been 'made by order of the Government, or by individuals, to procure copies 'of them; and when such do not exist, or cannot be procured, to get such 'information as you think can be relied on, and forward it to this Depart-'ment, with the mode and cost of transportation from the ports to the inte-'rior, and across from one sea to another. One object of the last inquiries is 'to determine whether, without the facilities of a canal, the charge of

'transportation, unshipping and reshipping, would or would not give to 'the passage across the Isthmus any advantage in the East India trade over 'the usual route. Connected with this object would be the inquiry, what 'quantity and value of the commodities of the Phillipines, China or the 'East Indies, would be consumed in the Republic, or the adjacent parts of 'Colombia and Mexico."

With this correspondence, for a time, seemed to close all negotiation in this business; but the subject was again revived in 1835—'6 by the appointment of CHARLES BIDDLE, Esq., by virtue of the resolution of the Senate before alluded to, who was specially charged, under instructions from Mr. FORSYTH, with the duty of making observations and inquiries, and collecting documents relative to the establishment of a communication between the Atlantic and Pacific oceans, by means of a rail-road across the Isthmus of Panama. This Isthmus was at that time, it seems, the only point of inquiry authorized by the President, and to this end, the appointment of a *special agent* had been made.

Mr. BIDDLE came on in March, 1836, and was introduced by Mr. McAFEE, then Charge d'Affaires of the United States to the Republic of New Granada, to the public authorities at Bogota. He soon entered upon negotiations with the Government, and made a full and minute examination (as would seem from his report) of the route from Panama to Chagres, with the view of constructing a road upon the macadamized plan between the two points.

I know of no better way to sketch the result of his investigations, than to make such liberal draughts upon his report to the Department of State, and the accompanying documents, as will briefly present all the essential points in the history of the undertaking to the general reader. A long train of correspondence ensued between the officers of the Republic and himself, (not necessary to recapitulate here,) which terminated in nothing particularly beneficial to either. This affords no proof, however, of the want of all proper industry and exertion on the part of the Government agent to accomplish the object of his mission. If he was culpable in any thing, it was for the misapprehension of his instructions.

The conduct of the officers of the Government of the Republic was open, frank and honorable; and it must have been to them quite an unpleasant event that Mr. BIDDLE should have so far misunderstood his powers and duties as to have required a disavowal, on the part of the United States, of his ever having been authorized to make the contract entered into by him. This matter was, however, as I find, subsequently very satisfactorily explained by Mr. McAFEE, so far, at least as he was involved in the correspondence; but the information obtained by Mr. BIDDLE, was really quite important and useful in its character, not only in a statistical point of view, but as evincive of the entire good-will, and the generous feelings indulged by the New Granadian Republic towards our own nation and country. This kind partiality for our institutions is distinctly marked in all their intercourse with us; nor is the negotiation with Mr. BIDDLE in any sense exempt from the like evidences of their high national respect and consideration.

The Congress of the Republic has often had this subject under serious advisement, (which, to a people so directly interested, is indeed, none other than *a very vital measure*,) and a liberality commensurate with its importance has ever marked all its acts and conduct, in reference to it.

All the correspondence, papers, documents, letters and proceedings connected with Mr. BIDDLE'S mission fully demonstrate this fact, and at the same time, they do not fail to prove the very deep feeling then and now pervading this entire community in favor of this projected enterprise.

The negotiations between this Government and that of the United States are worthy of particular notice; and a brief exhibit of some of the views and opinions that followed the negotiations, may not be unprofitable to our present purpose. This will be seen to be the more important at this great juncture, when another nation, whose power is felt in every sea, is at work, through her agents, in a zealous effort to accomplish what was then officially granted to a company in the United States. I shall have occasion, in a subsequent letter, to make particular allusion to what is now in agitation from that quarter.

Mr. BIDDLE, it seems, was content to confine his inquiries entirely to the country between Panama, Chagres and Lemon Bay. He never troubled himself, in the least, upon the subject of the proposed canal route, by the way of Lake Nicaragua. Nor did he attempt to look after the claims of that highly inviting and picturesque region in the vicinity of the river St. Juan, which for centuries has not failed to attract the attention and comment of all the intelligent portion of the civilized world. He rested his apology for this omission solely upon the opinions of a few individuals, whom he casually met with, *that such a project was utterly impracticable*. In justification of his neglect in this particular, he makes allusion, in his report, to the early steps taken by the Liberator, SIMON BOLIVAR, who sought out the most favorable communication between the two oceans.

I here give the views of Mr. BIDDLE, as illustrative of the easy mode by which he chose to arrive at his own conclusions in this matter, through the opinions of others: "At the period when General BOLIVAR held su-'preme command in Columbia, he manifested great zeal in obtaining ac-'curate information, relative to the most elegible mode of communication 'between the Atlantic and Pacific oceans. Skillful engineers, and the most 'accurate mathematical instruments were employed, without regard to 'expense. And, as the Liberator's influence was not confined to one 'State, but embraced every portion of the country, through which a com-'munication had been contemplated, the result of those examinations is 'entitled to great weight. The River St. Juan and the Lake Nicaragua 'were deemed ineligible, on account of the shallowness of the water, the 'numerous obstructions in the river, the violent hurricanes on the lakes, 'and the unhealthiness of the climate, and the great distance between the 'two oceans, it being more than treble that of the route by the river 'Chagres. Doctor PEDRO GAUL, a gentleman of distinguished talents, 'and well known in the United States, was at that time, Secretary of State, 'and took a deep interest in these investigations. A copy of his letter to 'me, dated the 10th of May last, is annexed, (marked M,) by which you 'will perceive, that in his opinion, *the opening of a canal for vessels of a 'heavy tonnage, is a chimera; and that a canal for vessels of lighter draught 'cannot be accomplished north of Panama.* This opinion is so universal 'and decisive, that the public attention has long since been altogether di-'verted from the consideration of a communication by the St. Juan river."

This may be good authority, and the opinions alluded to well founded, but great allowance must always be made for that *bias*, which sometimes steals unconsciously upon the mind, and which is so natural to the first settlers of a country in matters vitally affecting their own immediate interests. Opposed to these views stand those who bring great practical experience to their aid, and whose judgments are the result of actual examination and inquiry upon this great subject. Baron DE THIERRY (whose silly figure in this country, as the self-constituted *"Sovereign chief of New Zealnnd,"* it is true, greatly weakened the force and effect of his opinions) strongly maintained, when here, that the idea of a *rail-road* over the Isthmus was a *chimera*; and he quite as stoutly contended, that a ship-canal, to connect the Chagres and Rio Grande, was just one of the prettiest and easiest things in all the world. The Baron obtained, in 1835, upon certain specified conditions, the *exclusive right* to make the canal alluded to from the Congress of New Granada; and hence he may not, himself, have been exempt from motives sufficiently powerful to warp his judgment, and lead him to false and baseless conclusions.

Here I must close this communication. My next, in continuation of this subject, and in which, I shall present some striking facts to the American public, will bear date at Lima, in Peru.

I have the honor to be, sir, with assurances of high consideration, your fellow-citizen.

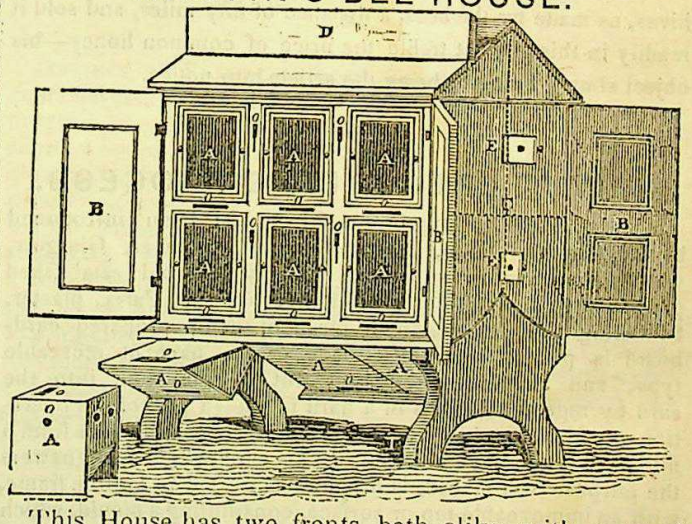
JOHN A. BRYAN.

FRANCIS MARKOE, Jr., Esq.

Corresponding Secretary, National Institute.

[To be continued in our 2 succeeding Nos., accompanied with maps of the Isthmus of Panama and Tehuantepec, defining the proposed routes of connection.]

MARTIN'S BEE HOUSE.



This House has two fronts, both alike, with a set of Boxes to each.

EXPLANATION.—A, represents the boxes which can be drawn out and replaced by the same or other boxes made to match as occasion may require. They have glass fronts. The one in front on the ground gives you the shape of the square boxes—those under the House have a triangular shape, and draw out on either side, extending across the whole House.

B, are the doors which secures the whole House when closed.

C represents the partitions on the coming together of the boxes inside.

D is a part of the roof, to let in light and assist in ventilation of the whole House.

E are two sliding gates, that have holes in them, to draw out or shove in as may be necessary to allow the bees a communication or to prevent them.

o are entrances for the Bee.

This Bee-House you will perceive, is well lighted and ventilated, which is actually necessary to produce beautiful Honey in appearance. Below we give an extract from one of our daily papers, of this celebrated Honey Mansion, which one of the Proprietors of this Journal is willing to subscribe to, having had the pleasure of testing its superior qualities by tasting.—PROPRIETORS.

PURE WHITE HONEY.—We have lately had an opportunity of examining at the Hotel of Messrs. Tyler & Birch, some of the most beautiful white honey that we ever saw in this or any other country. Mr. GEORGE CALVERT, of Upperville, Virginia, the agent for the sale of the right to vend Martin's Patent Bee House, is now in this city exhibiting this superior honey, which has been produced in one of Martin's Bee Houses. Although we cannot speak from our own experience, having had no practical acquaintance with Martin's Bee Hives, yet we can have no hesitation in saying that the specimens exhibited by Mr. Calvert, and produced as above stated, afford the strongest evidence of the value of Martin's Patent Bee Houses over all others that we have seen either in England or in this country. The Editor of the Constitution, who has tested this new and excellent invention of Mr. Martin, says:

"We have had an opportunity to become practically acquainted with this unequalled contrivance for the honey-bee. For simplicity, convenience, and adaptation to the wants and habits of this most useful and industrious of the insect tribe, this bee house exceeds, in our judgment, all others."

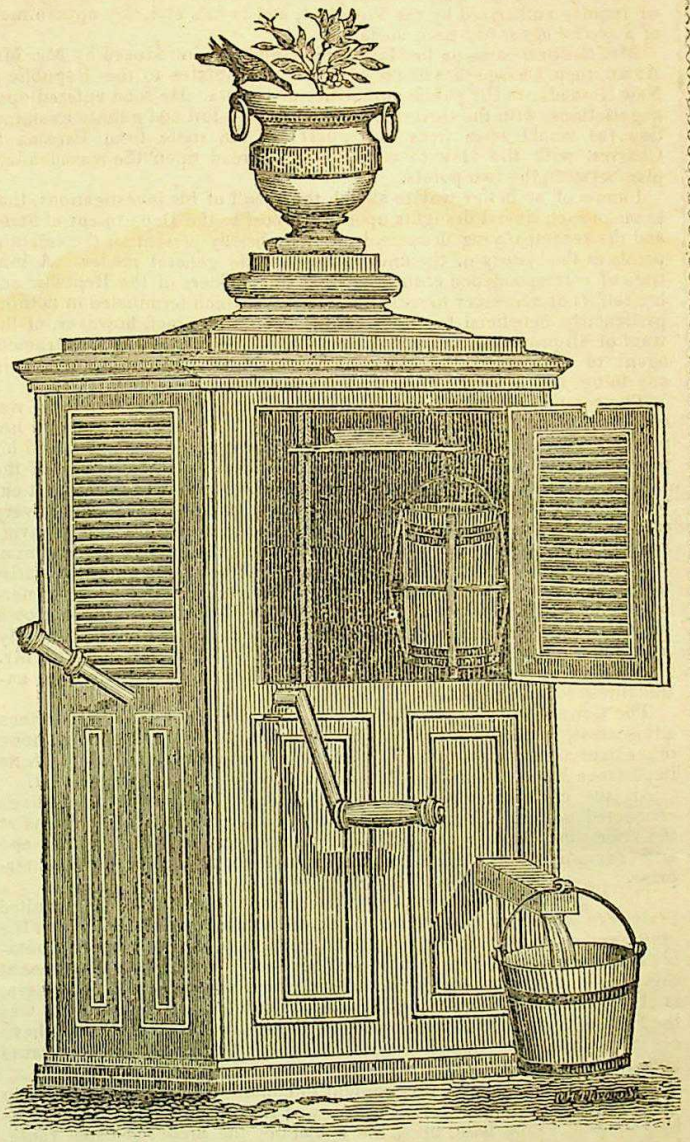
We understand that Mr. Calvert brought this honey in the hives, as made by the bees, a distance of fifty miles, and sold it readily in this city at treble the price of common honey—his object simply being to bring the article into notice.

NEW STEREOTYPING PROCESS.

A new stereotyping process has just been introduced by Mr. Hugh Wilson, lithographer and engraver, Glasgow, which promises to supersede entirely the old established process by taking casts of the types in Paris plaster. In taking the impression, a piece of damp prepared cardboard is placed over the surface of the page of moveable type, and an impression beat out of the type into the card by repeated strokes of a hard brush—a part of the operation of which, according to the size of the page, occupies from a minute to a minute and-a-half. This card, which now answers the purpose of a matrix, is dried and inserted in an iron frame, with an immoveable top or surface, constituting a mould, which has been previously heated to an equable temperature. The lid is then brought down, the mould shifted by a hinge from the horizontal to the perpendicular; and the liquid metal poured into the matrix by a small orifice which has been left, and in a minute the stereotype page is produced complete. At least, the only preparation for the press which it requires is the trimming of the superfluous edges, which is done by a circular saw with great celerity. The back of the plate is as smooth as the slab of metal from which it received its impression, and thus the planing process in stereotyping is now done away. The whole operation is perfectly clean, and may be conducted and completed in less than an hour, while by the ordinary process the period varies from 10 to 12 hours, liable to the breaking, splitting, or warping of the stucco matrix, risks which are unknown in the new card process. Plates may be produced by this process as distinct and clear as any that have been cast from stucco. As many as a dozen casts may be taken from the same card.

IMPROVED WATER FOUNTAIN.

Patented, September 9th, 1846.



This Fountain consists of a double windlass constructed on one shaft for the purpose of lengthening and shortening the ropes as the water rises and falls, combined with two Zinc or Iron bound buckets, so as to draw water from any depth while the buckets always balance each other. These buckets have a valve in their bottoms so that they can be filled and emptied without turning them over, when they are raised, they set in a trough or swing spout in which they empty the water, being conveyed thence through a stationary spout into a bucket, or arranged with two ropes attached to each bucket, which can be emptied by having two hooks fastened to a stationary spout. This is one of the cheapest and greatest labor saving Machines extant, and should be in possession of every Farmer and housekeeper. SABIN & HOWE.

AGRICULTURAL.

THE CROPS FOR 1845.—The report of the Commissioner of Patents, makes the following estimate of the crops of that year;—Wheat, 106,548,000 bushels; Barley, 5,160,600 bushels; Oats, 163,208,000 bushels; Rye, 27,175,000 bushels; Buckwheat, 10,268,000 bushels; Corn, 417,899,000 bushels. Total—Grain, 730,258,600 bushels; Potatoes, 88,392,000 bushels; Hay, 14,065,000 tons; Hemp and Flax, 37,500 tons: Tobacco, 187,422,000 pounds; Cotton, 936,088,000 pounds; Rice, 89,765,000 pounds; Silk, 486,530 pounds; Sugar, 226,026,000 pounds. Pennsylvania produced 12,580,000 bushels of Wheat; 141,000 of Barley; 19,826,000 of Oats; 11,929,000 of Rye; 3,322,000 of Buckwheat; 17,126,000 of Indian Corn; 5,497,000 of Potatoes; 1,527,000 tons of Hay; 535,000 pounds of Tobacco; 41,370 pounds of Silk Cocoons, 1,600 000 pounds of Sugar. Our own State stands third in the list of Agricultural products. Ohio stands second; New York first.

FARMING IN GREAT BRITAIN.—A London paper states that at the present moment, "with an area of 61,522,970 acres in the United Kingdom, there is only one proprietor for every 305 acres. The "stout yeoman" class is rapidly disappearing; the number of persons farming their own land, every day diminishes; a dozen properties are run together into the hands of one holder; three or four small farms are combined into one large one; the small farmer, is now an animal almost as rare as the small landlord; and the children of those who constituted the former tenantry of the country, have become the laborers on the very land their ancestors cultivated as holders. Farming, like all other trades, is becoming a wholesale business, and while a few are becoming extensive and wealthy agriculturists, the mass are sinking into hopeless poverty."

A CALIFORNIA FARMER.—A gentleman writing from California, to the editor of the St. Louis Reveille says, his stock consists of about 4000 head of oxen, 1700 horses and mules, 3000 sheep, and as many hogs. They all pasture themselves without difficulty in the rich prairies and bottoms of the Sacramento, and only require to be attended. This is to be done by Indians of whom he employs 400. His annual crop of wheat is about 12,000 bushels, with barley, peas, beans, &c., in proportion.

FRUIT TREES.—An excellent plan for preventing young fruit trees from becoming hide-bound and mossy, and for promoting their growth and health, is to take a bucket of soft soap, and apply it with a brush to the stem or trunk, from top to bottom,—this cleanses the bark and destroys the worms, or the egg insects; and the soap becoming dissolved by the rain, descends to the roots, and causes the tree to grow vigorously.

USE OF GRAPES.—Dr. Underhill strongly advises the culture of grapes, both on account of the profit to be derived from the sale of them, and from their value as food to sick and convalescent persons. At a late meeting of the New York Farmer's Club, Dr. Underhill made some highly valuable observations on this subject. After fifteen years trial with various kinds of grapes, he prefers some of our natives, and recommends the Catawba and Isabella. He has three acres of the former, and seventeen of the latter. He says our people eat too much animal food which renders their blood too thick, and causes diseases of the heart, liver and lungs. He thinks it would be infinitely better to substitute grapes and other fruit, for a portion of animal food.

DRIED STRAWBERRIES.—Last summer, by way of experiment, when strawberries were plentiful, I attached threads to their stalks, and hung up a few which were over-ripe to dry. I placed them inside a window facing the south, where they remained from June last until the present time, (March 28.) They have just been tasted, and the result is most satisfactory. That sweet refreshing acid which is peculiar to the strawberry in full perfection; the flavour of the fruit, without any watery taste, is delicious; it dissolves in the mouth as slowly as a lozenge, and it is infinitely superior to the raisin, which so soon bring on a feeling of satiety. The strawberry thus dried is a stomachic. The experiment may be tried when the fruit is so ripe as to be scarcely worth gathering, without any further expense or trouble than being hung up.—*London paper.*

CAROLINA FIGS.—A correspondent of the Savannah Republican, states that as good figs can be prepared in Georgia and Carolina as the imported article. He gives the following recipe for preparing them:

"Gather the figs with the stems to them, before they are fully ripe; have a syrup prepared either of brown or white sugar, and while boiling, put in your figs and let them remain till they become flat, which will be in a few minutes, take them out, put them on a dish or tray, and place them in the sun, after they have drained, place them in another tray, taking care to turn them; let them be turned and gently pressed down twice a day. Two or three days sunning is sufficient to cure them. Before boxing them, have some dried loaf-sugar sifted upon them—box them, and they are ready for use. It is important that they are not allowed to stay too long in the boiling syrup—if they do, they can never be properly dried."

INSTINCT OF PLANTS.—Observation shows that plants have hours devoted to rest, during which time they make little or no progress in growth. A curious proof of this statement was afforded by an account of a gentleman, who had an artificial illumination kept up in his graperies throughout the night, and where this was done the grapes ripened sooner by several weeks; but subsequent accounts inform us that the vines thus stimulated were much weakened.

Some plants, like some animals have been ordained for night; and these, accordingly are active only during those hours. The night-blowing Cereus is an example of this sort. Others, that increase and flourish during the day, close their flowers, and frequently their leaves, remaining inactive throughout the night.—*Magazine of Science.*

CONSTITUENTS OF CERTAIN PLANTS.—The following table, by Dr. Lyon Playfair, is valuable—showing the relative worth of various plants, and for purposes of comparison. The results of analysis agreed very clearly with those of Sprengel.

100 *lbs. contain of water.*		*Organic matter.*
Peas,	16	80 1-2
Beans,	14	82 1-2
Oats,	18	72
Barley Meal,	16 1-2	82 1-2
Hay,	16	76 1-2
White Turnips,	89	10
Ruta Baga,	85	14
Mangel Wurtzel,	89	10
White Carrot,	87	12
Potatoes,	72	27
Red Beet	89	10

Asafœtida.—This plant is a production of the Eastern part of Persia. Its stem is from one to two and a half feet in height; the leaves resemble those of the Indian beet-root, and when ripe produces a cauliflower-like head of a light straw color. The milky juice extracted near the root congeals into the well known gum, of which each plant yields about a pound; but the plants themselves, especially when young, are prized as a high delicacy by the natives, who stew or roast the stem, and boil or fry the head and leaves with clarified butter. In this way the smell is even stronger and more rank than in the form of a drug, and none but those accustomed to it, can endure its offensive effluvia.

A Hydraulic Cotton Press has been lately established at Savannah, which will confer great advantages on the shipping interests of that city. A practical illustration of this is given in the Savannah Republican. The average of seven cargoes of un-compressed cotton successively taken out to Liverpool by the ship Eli Whitney, was 1,777 bales, or 675,127 pounds. A few days ago, this same vessel cleared for Havre, with a cargo of 2,461 bales, or 980,420 pounds of compressed cotton. The Republican adds.—

Thus it appears that by the use of compression in the loading of this single vessel, there has been a gain to the owners of 690 bales or 305,293 lbs. This, at one cent per pound freight, is equal to $3,052,93. We will suppose that the expenses of compression, stevedores, port-charges, &c., &c., are equal to $1 per bale. It therefore follows that the saving to the owners by compression on this single cargo, is equal to the entire charges and expenses from the time the vessel touches the wharf, until she is again ready for sea. In other words, the voyage will yield to the owners about $1,500 more than if there had been no cotton press in Savannah!

Poultry Houses.—If you wish your hens to lay through the winter, have their houses cleaned out thoroughly. Empty the nests of all filth, have them scraped inside and out, and then whitewashed. Place contiguous to your hen house under roof a peck or so of lime, a bushel of gravel, and a load of sand or ashes, so that they can daily have access to these substances. Give them chopt fresh meat, once a week or oftener, and feed them regular twice a day, with grain and potatoes—always feeding them near the hen house, so as to attach them to it. Keep their nests at all times well supplied with clean hay, and a few chalk imitation eggs in each, if you have no chalk, clay will answer every purpose, provided you whiten the eggs by white washing them. See too that your fowls get water regularly. If you follow this advice, you will find that your hens will lay nearly as many eggs in winter as they do in summer.—*American Farmer.*

Save your Soap Suds.—There is scarcely a plant that is not benefited by watering with soap suds. It furnishes nutritive matter as well as moisture—keeps off insects, and promotes a rapid growth. The Gardener's Chronicle states, that while there has been a great failure in the cabbage and cauliflower gardens generally, those watered with soap suds have produced plants of the finest quality, and entirely escaped the injuries inflicted by insects upon others.

Effect of Color on Vegetation.—The fact has been fully established by the Royal Polytechnical Society of England, that the blue or violet rays of light are far more conducive to vegetation than other colored rays. If two pieces of colored glass, the one blue and the other yellow, are placed horizontally over a bed of earth, in which seeds are sown, it will be seen that those under the blue glass, will spring up and grow in half the time, and with double the strength of those under the yellow or orange colors. The glasses, for this experiment, must not rest on the earth, but be supported an inch or more above the surface. We are not confident that the effect will be the same on all kinds of seeds, but if this should prove to be the case, it will be well to use blue glass in the sashes of green houses generally.

Green Corn Pudding.—The Louisville Journal says, one of the very finest things ever brought to the table, in the pudding line, is green corn pudding, prepared according to the following recipe:—Let every wife, who would like to surprise her husband by a rare delicacy, try it. Take of green corn twelve ears, and grate it. To this add a quart of sweet milk, a quarter of a pound of fresh butter, four eggs, well beaten, pepper and salt, as much as sufficient; stir all well together, and bake four hours in a buttered dish. Some add to the other ingredients a quarter of a pound of sugar and eat the pudding with sauce. It is good cold or warm, with meat or sauce; but epicures of the most exquisite taste declare for it, we believe, hot, and with the first service.

Worthy of Imitation.—The late Ohio Legislature incorporated a "Farmer's College," to be devoted to the instruction of young men in theoretical and practical agriculture, including a whole scientific course, and a fair proportion of belle letters. The institution is located at Mount Pleasant, a fine situation on the banks of the Ohio, six miles south of Cincinnati. Dr. Bishop, formerly of Miami University, is to be its President. It will not be many years before Agricultural Colleges will be erected in all the States of the Union.

The Flower Garden Companion, *by Edward Sayers, Cincinnati.*—The increasing taste for Floriculture, has called for further assistance to *Neophites*, and right glad are we, that one so able, as is Mr. S. to impart instruction in that delightful pursuit, has afforded us the benefit of his evidently enlarged experience. The "Companion," is ushered forth without parade or pretension to more than it really is, "a manual to assist the farmer, the mechanic and the amateur, in the general culture of flowers." It is arranged under ten separate chapters; commencing with the laying out of the flower garden, and conducting the uninitiated, step by step, through every stage, of the propagation and subsequent culture of plants, in the parterre, the sitting room and the green-house; and we make no doubt, an observance of its simply expressed rules, will enable those least experienced, successfully and of course pleasantly to pursue that charming recreation.

The work is judiciously arranged as to space, each subject being confined to its proper share; and the whole embraced by 200 well printed pages, and is offered at a price which brings it within reach of all.—*United States Gazette.*

Diamond Cement.—This article, so much esteemed for uniting pieces of broken glass, for preparing precious stones, and for cementing them to watch cases and other ornaments, is made by soaking isinglass in water until it becomes quite soft, and then mixing with spirit in which a little gumelastic and commoniacum have been dissolved.

Beautiful Wheat.—A sample of the richest seed wheat we have ever seen, was left at our office yesterday. It is of the importation of Commodore Stewart, in honor of whom, several of the Agricultural Societies have christened it "the Stewart Wheat." This sample is of the fifth sowing of the same importation, and we learn that no change has been observed either in size, color, or hardiness. Our agricultural friends should test this wheat. An inferior article being oftentimes mixed with the genuine wheat, it would be well for our farmers to apply direct to Commodore Stewart, so as to insure themselves pure and good seed, which is essential if you wish to have large and good crops, or by inquiring at this office they may learn where the seed can be had.—*Sun.*

The Potatoe Disease.—Mr. M. C. Webster has addressed a letter on the subject of the potato disease, which is serious and alarming in that quarter, to the editors of the Hartford Courant. Mr. Webster says the tops of the potatoes should be mown off when they are about half or two-thirds grown. He has tried the experiment, and found it fully successful, He mowed off one half a potato patch, and left the remainder as they were. Those left with the vines on were nearly destroyed by the disease, while in that portion from which the vines were cut not a single diseased potatoe was found. It has been found, too, that cutting off the vines does not diminish the roots.

LEGAL INTELLIGENCE.

Under this head, we propose, from time to time, to furnish a complete digest of all the important Patent cases, which are decided either in our Country or Europe.

Jurisdiction.—The following patent decision in Equity in the Case of Elijah Prentiss *versus* Henry L. Ellsworth, the late Commissioner of Patents, has been made by the late Hon. A. Randall, Judge of the U. S. Circuit Court at Philadelphia in relation to the jurisdiction of the U. S. District and Circuit Courts, in the settling of legal questions pending between Patentees and the Commissioner of Patents.

The complainant filed his bill complaining that the defendant as Commissioner of Patents, had refused to grant him a patent for certain improvements made by him in the art of weaving goods of various kinds, and prayed the Court should by decree order the Letters Patent prayed to be issued:

The defendant filed a plea to the jurisdiction and a General Demurrer to the bill.

Mr. B. H. Brewster, for Commissioner of Patents, maintained that the Court has no jurisdiction. That the defendant did not reside and was not within its jurisdiction at the time process issued. (Act of Congress 11 sec., Act of $9. The only Court that can have jurisdiction at any stage of proceedings to obtain a patent, is the Circuit Court of the District of Columbia. (Act of 1801 and 1815. 4. Cranch, 421; 5 Cranch, 288; 8 Wheaton, 699; 7 Cranch, 202; 1 Peters, C. C. R., 489.)

Unless the Court has jurisdiction under the Patent Laws, or by some other act of Congress, the bill must be dismissed. (5 Cranch, 173, 1 Wash., 232; 4 Dallas, 7.) The Patent Laws contain no provision investing the Circuit Courts with such authority. The policy of the law is against the exercise of this authority. The Commissioner would be exposed to endless trouble and inconvenience. He would be compelled to answer at the same time at different points of the Union; and if the prayer of the Bill were granted to carry with him the models, books, papers and documents that are of record in the office at Washington, when thereby the public interests would require them to be in the custody of the Department at the seat of Government. (2 Kent, 355 to 372, Phillips on Patents, 313, 57, 379.) The law furnishes a remedy for the errors of a hasty examination of an application for a patent. (7 Sec. of Act of '36.) The complainant must strictly conform to the provisions of that Act, before he can apply for the intervention of a Court of Equity, even had this Court jurisdiction, and he must aver in his bill that he has conformed to the provisions of the law. That he has not done. The bill does not state that he has complied with the provisions of the Act of 39.

(Peters C. C. R. 356. 3 Howard 441.) The Commissioner of Patents is the Judge created by law to decide upon these questions—to him must application be made, and renewed after a certain formal method laid down in the act, and this court could not now assume to decide the question, even had it *concurrent* jurisdiction, much less when the exclusive jurisdiction is vested in the Commissioner. (9 Wheaton, 532; 1 Paine 620.)

This Court has no power to enjoin or command an officer of the General Government residing at Washington, to perform any act. How then could it enforce its decree! (1 Kent 322; 3 Dallas 42; 9 Peters 574, 602; 8 Peters 306; 12 Peters 524; 13 Peters 279; 7 Peters 634; 7 Cranch 577.

Mr. Waln, in reply, said—If the Court has no jurisdiction, then the party aggrieved is without remedy. The argument ab in convenienti can never be urged to deprive man of his rights and all legal protection. The jurisdiction is expressly given by the 16th section of the act of '36, and 10th section of the act of '39. The law provides that expenses shall be paid by complainant in contemplation of the inconvenience to which the Commissioner might be subjected in complaints like this. If parties are confined to the Courts of the District of Columbia, then they could not have the decrees of the Courts enforced in any other part of the United States, except in their local jurisdiction. It is a narrow construction of the law to oust the jurisdiction.

Randall J.—The bill in this case, charges that on or about the 8th day of March, 1843, the complainant entered a caveat in the Patent Office of the United States, describing certain improvements made by him in the art of weaving, and that on or about the 8th day of August, 1844, he preferred his petition to the Commissioner of Patents, wherein he represented that he had invented certain new and useful improvements in the apparatus for weaving goods of various kinds, and did therein claim as new ("as specified in the bill.") The bill further charged that the complainant, having in all things complied with the terms and conditions of the act of Congress in such cases made, having furnished specifications, drawings and models, and paid into the treasury the legal fee, he did pray that letters patent of the United States might be granted, vesting in him, and his legal representatives the exclusive right to the said invention, &c., and that the Commissioner intending, &c., absolutely refuses to comply with the said reasonable request. After stating the formal excuses or pretences, and propounding certain interrogatories, the orator prays that a copy of the bill may be served on the Commissioner of Patents, and that he may be required to answer, to produce the specification, model, drawing and claim, and that the Court will order and decree, that the letters patent be issued as specified in his claim.

To this bill the defendant has filed a special plea, denying the jurisdiction of this Court, "because he says the supposed causes of complaint and each and every of them accrued out of the jurisdiction of this Court, and that the said defendant, Commissioner as aforesaid, was not found within the jurisdiction of the Court at the time of serving the writ in this complaint, nor was he an inhabitant within the jurisdiction of this Court at the time of serving the writ of supæna on this complaint, and that he is not liable as Commissioner as aforesaid to the jurisdiction of this Court."

He has also filed a general demurrer to this bill. It is admitted that unless the jurisdiction is given by the 16th section of the act of July 4, 1836, (4 Story, 25, 11,) and the 10th section of the act of 3rd March, 1839, (9 Laws U. S. 1020,) the complainant cannot have the relief prayed for in this Court.

By the 7th section of the act of 1836, it is enacted.

That on the filing of any such application, description, and specification, and the payment of the duty hereinafter provided, the Commissioner shall make, or cause to be made, an examination of the alleged new invention or discovery; and if, on any such examination, it shall not appear to the Commissioner that the same had been invented or discovered by any other person in this country, prior to the alleged invention or discovery thereof by the applicant, or that it had been patented or described in any printed publication in this or any foreign country, or had been in public use or on sale, with the applicant's consent or allowance, prior to the application, if the Commissioner shall deem it to be sufficiently useful and important, it shall be his duty to issue a patent therefor. But whenever, on such examination, it shall appear to the Commissioner that the applicant was not the original and first inventor or discoverer thereof, or that any part of that which is claimed as new had before been invented or discovered, or patented, or described in any printed publication in this or any foreign country as aforesaid, or that the description is defective and insufficient, he shall notify the applicant thereof, giving him briefly such information and references as may be useful in judging of the propriety of renewing his application, or of altering his specification to embrace only that part of the invention or discovery which is new. In every such case, if the applicant shall elect to withdraw his application, relinquishing his claim to the model, he shall be entitled to receive back twenty dollars, part of the duty required by this act, on filing a notice in writing of such election in the Patent Office; a copy of which, certified by the Commissioner, shall be a sufficient warrant to the Treasurer for paying back to the said applicant the said sum of twenty dollars. But if the applicant, in such case, shall persist in his claim for a patent, with or without any alteration of his specification, he shall be required to make oath or affirmation anew, in manner as aforesaid; and if the specification and claim shall not have been so modified, as, in the opinion of the Commissioner, shall entitle the applicant to a patent, he may, on appeal and upon request in writing, have the decision of a board of examiners, to be composed of

three disinterested persons, who shall be appointed for that purpose by the Secretary of State, one of whom, at least, to be selected, if practicable and convenient, for his knowledge and skill in the particular art, manufacture, or branch of science to which the alleged invention appertains; who shall be under oath or affirmation for the faithful and impartial performance of the duty imposed upon them by said appointment. Said board shall be furnished with a certificate in writing of the opinion and decision of the Commissioner, stating the particular grounds of his objection, and the part or parts of the invention which he considers as not entitled to be patented. And the said board shall give reasonable notice to the applicant, as well as to the Commissioner, of the time and place of their meeting, that they may have an opportunity of furnishing them with such facts and evidence as they may deem necessary to a just decision, and it shall be the duty of the Commissioner to furnish to the board of examiners such information as he may possess relative to the matter under their consideration. And on an examination and consideration of the matter by such board, it shall be in their power, or of a majority of them, to reverse the decision of the Commissioner, either in whole or in part; and their opinion being certified to the Commissioner, he shall be governed thereby in the further proceedings to be had on such application: *Provided, however*, That, before a board shall be instituted in any such case, the applicant shall pay to the credit of the Treasury, as provided in the ninth section of this act, the sum of twenty-five dollars; and each of said persons so appointed shall be entitled to receive, for his services in each case, a sum not exceeding ten dollars, to be determined and paid by the Commissioner out of any moneys in his hands, which shall be in full compensation to the persons who may be so appointed, for their examination and certificate as aforesaid.

The 8th section provides that whenever an application shall be made for a patent, which in the opinion of the Commissioner would interfere with any other patent for which an application may be pending, or with any unexpired patent which shall have been granted, it shall be the duty of the Commissioner to give notice thereof to such applicant or patentee, as the case may be, and if either shall be dissatisfied with the decision of the Commissioner in the question of priority of right or invention, he may appeal from such decision on the like terms and conditions as are provided in the preceding section.

The 16th section then enacts—That whenever there shall be two interfering patents, or whenever a patent or application shall have refused an adverse decision of a board of examiners, on the ground that that patent applied for would *interfere* with *an unexpired patent previously granted*, any person interested in any such patent, either by assignment or otherwise in the one case, and any such applicant in the other case, may have remedy by bill in equity; and the Court having cognizance thereof, on notice to adverse parties, and other due proceedings had, may adjudge and declare *either* the patents void in the whole or in part, or inoperative and invalid in any particular part or portion of the United States, according to the interest which the parties to such suit may possess in the patent or the inventions patented, and may also adjudge that such applicant is entitled, according to the principles and provisions of this act, to have and receive a patent for his invention, as specified in his claim, or for any part thereof, as the fact of priority of right or invention shall in any such case, be made to appear. And such adjudication, if it be in favor of the right of such applicant, shall authorise the Commissioner to issue such patent, on his filing a copy of the adjudication, and otherwise complying with the requisitions of this act: *Provided, however*, That no such judgment or adjudication shall affect the rights of any person, except the parties to the action, and those deriving title from or under them subject to the rendition of such judgment.

This section gives the remedy by bill in equity, to those cases only provided for by the 8th section of this act. But by the 10th section of the act of 1839, it is declared—That the provisions of the sixteenth section of the before recited act shall extend *to all cases where patents are refused for any reasons whatever*, either by the Commissioner of Patents or by the Chief Justice of the District of Columbia, upon appeals from the decision of said Commissioner, as well as where the same shall have been refused on account of, or by reason of, interference with a previously existing patent; and in all cases where there is no opposing party, a copy of the bill shall be served upon the Commissioner of Patents, when the whole of the expenses of the proceeding shall be paid by the applicant, whether the final decision shall be in his favor or otherwise.

The effect of this section is to give to all persons whose applications are refused under the 7th section, (and who were concluded by the decision of the Board of Commissioners under the act of 1836,) the same remedy as was provided for those who came within the provisions of the 8th section. The remedy is by bill in equity, in the Court *having cognizance thereof.*

On the part of the complainant, it is contended that inasmuch as the 17th section of the act of 1836, declares that all actions, suits, controversies and cases arising under any law of the United States, granting or confirming to inventors the exclusive right to their inventions or discoveries, shall be originally cognizable, as well in equity as at law, by the circuit courts of the United States, or any district court *having the powers and jurisdiction of a Circuit Court*—that Congress did not intend to give jurisdiction to the courts of the District of Columbia, where there is no district court *having the power of a Circuit Court*, but to the courts of the United States, established by the Judiciary Act of 1789, and the complainant being a resident here, this court has the jurisdiction.

In the construction of statutes every part of the act and acts in pari materia are to be taken together for the purpose of discovering the intention of the Legislature, which when ascertained is to prevail. It shall be so construed if possible that no clause, sentence or word shall be rendered superfluous or void. And when great inconvenience will result from a particular construction, that construction shall be avoided, unless the meaning of the Legislature be plain, in which case it must be obeyed. (2 Cranch, 386.)

With these rules in view let us examine the question presented for consideration.

By the section of the act of September 24, 1789, establishing the Judicial Courts of the United States, it is enacted that no person shall be arrested in one District for trial in another in a civil action before a Circuit or District Court, and no civil suit or action shall be brought before either of the said Courts against an inhabitant of the United States by any original process in any other District than that *whereof he is an inhabitant, or in which he shall be found* at the time of serving the writ. The third section of the act of 27th February, 1801, concerning the District of Columbia, (3 Story, 2089 appx.) declares there shall be a Court in the said District, which shall be called the Circuit Court of the District of Columbia: And the said Court and the Judges thereof shall have all the power by law vested in the Circuit Courts and the Judges of the Circuit Courts of the United States. And by the 5th section the said Court shall have cognizance of all cases in law and equity between parties, both or either of whom shall be a resident or found within said district.

The 4th section of the act of March 3, 1815, vesting more effectually jurisdiction in State Courts, (2 Story, 1531,) enacts that the District Courts of the United States shall have cognizance concurrent with the courts and magistrates of the several States, and the Circuit Courts of the United States, of all suits at common law, when the United States or any officer thereof, under the authority of an act of Congress shall sue, although the debt, claim or other matter in dispute, shall not amount to one hundred dollars. Various other statutes have been passed, either imposing penalties or providing relief, in which it is said the District or Circuit Courts of the United States shall have jurisdiction, but in all such cases it is understood the intention of Congress was to give jurisdiction to those Courts according to well known and settled principles—these principles are, that process for the institution of a suit, either at law or equity, in the District or Circuit Courts, shall not run beyond the limits of the District for which the court from which it issues is held. And that the Circuit Court for the District of Columbia, has full equity powers where both or either of the parties shall be found within that jurisdiction. The prohibition of the service of process out of the jurisdiction is, however, a personal privilege, which may be waived, but in the present case the defendant has availed himself of the first opportunity to make the objections.

Another objection to the jurisdiction of this court is the mode of enforcing obedience to its decree. It is to be presumed that a court will not take cognizance of a cause, unless it can execute its judgment. Now, if this court should take jurisdiction of the complainant's bill, and decide that he is entitled to a patent, how can that decision be enforced if the Commissioner should refuse to issue the patent? The proper remedy would seem to be by a mandamus, but the Supreme Court have decided that the Circuit Courts out of the District of Columbia have no authority to issue a writ of mandamus to an officer of the United States, commanding him to do a ministerial act. But that the Circuit Court for the District of Columbia has such power (Kendall vs. United States, 12 Peters, 525.) In every aspect of the case it appears to me that this Court has no jurisdiction of the complaint. By this construction, full effect may be given to every word of the section under consideration—where there are two interfering patents, the Circuit Court of the District, whereof the defendant is an inhabitant or where he may be found, is the Court "having cognizance," when an original application for a patent has been refused, and there is no opposing party, so that the process, a copy of which is to be served on the Commissioner of Patents, the Circuit Court of the District of Columbia, of which the Commissioner is an inhabitant, and which can enforce its judgment, is the proper tribunal.

This view also avoids the great inconvenience which would result from the construction contended for by the counsel for the complainant.

The bill prays that the Commissioner be required to produce, on the hearing the specifications, models, drawings, &c., and these may be necessary to enable the Court to determine upon the validity of the application for a patent. If the Commissioner can be required to produce these in this Court, he may with as much propriety be called on to answer similar applications in any Circuit Court of the Union. An inconvenience, to say the least of it, which, if it had been intended by Congress, they would have used plain, precise and clear language, such as would not leave the intention open to judicial construction, or leave it liable to be misunderstood.

This view renders it unnecessary to consider the argument urged in support of the demurrer. The plea to the jurisdiction is sustained, and the bill dismissed for want of jurisdiction.

IMPORTANT CASE.—The following very important matter is now pending in the United States Circuit Court:

Morse and others vs. O'Reilly, Downing, and others.—A bill has been filed on the equity side of the court by the plaintiffs, alleging an intringement right of the patent right of Professor Morse, for the Electro-Magnectic Telegraph. It applies to the line between Philadelphia and Pittsburgh, through Harrisburg, so far as the jurisdiction of the Court extends. On Saturday last, John Miles, Esq., counsel for Professor Morse, F. O. J. Smith, Alfred Vail, and Leonard D. Gale, who are the proprietors of the Patent right, moved for an injunction against Mr. O'Reilly and his associates, for using Professor Morse's invention without license from Philadelphia through Harrisburg to Pittsburgh.

W. M. Meredith, Esq., appeared for the defendants; and the motion for the injunction prayed for, is to be heard on Saturday next.

The case is of considerable interest, as the public well know that the Electro-Magnectic Telegraph system has produced wonderful results. It seems that Franklin and other scientific men, at Paris, had an *idea* of a telegraphic system by a combination of electricity and magnetism at an early day, but, without disrespect to them, it may be stated that Professor Morse, after years of study and experiment, *practically applied* the idea to telegraphic communications, when all other attempts in Europe had failed. Professor Morse, after securing his patent here, went to Europe, and was refused a patent under the laws of Great Britain and France, simply upon the ground that he was a *citizen of the United States*, though efforts were made by the most intelligent and scientific men in those countries, to give him the proper reward for his great invention. Failing in that, an imitation of his invention has been attempted in England and in France, but without that *practical* success which is seen and felt every day at our own doors.

This bill alleges, in substance, that the proprietors of the patent right, (Morse and others,) agreed with O'Reilly and others, that he might raise capital by subscriptions, from individuals to build a line from Philadelphia through Harrisburg to Pittsburgh, and thence to the Mississippi and the Lakes, *upon condition* that as a compensation for their patent right, the proprietors should own one quarter of the stock—depending upon the profits of the line for remuneration; and then the proprietors were to grant a license to use the said invention.

The bill further alleges that, *under color of this agreement*, but in *violation of its provisions*, the defendants have organized companies, issued certificates of stock, borrowed money, and constructed and put into use a line of Telegraph between Philadelphia and Pittsburgh, without license from the owners of the patent right, and in the cost of the construction of the line have been speculating upon the community to raise funds, to the injury of Professor Morse and his co-owners: thus, as it is alleged, taking from him the first practical fruits of his invention, which have been ascertained to be so beneficial to mankind.

What defence to these allegations the defendants may make, of course cannot be known until the hearing; and then will be duly reported.

It is proper to mention that the bill states that the subscribers to the stock of the company thus illegally organized, as alleged, *who have paid their money*, have been tendered by the proprietors of the patent right full shares of stock, so that they can suffer no injury.—*Phil. U. S. Gazette.*

SCIENTIFIC INTELLIGENCE.

MINERAL WEALTH AND RESOURCES OF VIRGINIA.—That portion of Virginia known as the tide-water district, like all the seaboard country south of the Gulf of St. Lawrence, is barren in minerals; but even there nature has not withheld other favors, than those which meet the eye of the casual observer. Throughout this whole region, extensive beds of marl are found, waiting for the hand of industry to use them in restoring the exhausted fields, which the improvident agriculture of our ancestors have entailed upon their descendants.

If we draw a line across the State, from Maryland to North Carolina, passing the Potomac, Rappahannock, James, Appomattox, and Roanoke rivers, at the head of tide-water, we divide two important sections of Virginia, whether we consider their topographical features, or general geological structure. West of this line, to the summit of the Blue Ridge mountains, is what is termed "the middle country." This district possesses many striking advantages for the agriculturist, as well as inducements for the investment of capital in mining and manufacturing.—The most important mineral formation in this region is the bituminous coal. This coal-field commences one mile east of the Tuckahoe creek, and twelve above Richmond, (measured by the line of the James and Kanawha River Canal, which passes through that portion of the field, north of James river.) Its western limit is on the head waters of Jones' creek, in Powhatan—the northern out-cross near the line, dividing Henrico and Hanover counties—to the south it extends to the Appomattox, and very probably beyond it. Within these limits, coal is mined at many places; and in some the workings are quite extensive. On the north side of the river, the mines of Messrs. Croucher and Sneads, Randolph's, Barr's, Woodward's, Barr and Daton's, and Duval's are the principal. On the south side, the Blackheath, Mid-Lothian, Mills and Reed's Stonehenge, and Jaller's, are the most extensive. The Clover-Hill mines are now worked to a sufficient extent to attract attention to the very excellent coal which they yield. The coals from this field, both north and south of James river, will compare advantageously with the bituminous coals both of this country and Great Britain, as is shown by Professor Johnson's Report to the Secretary of the Navy, "On the Evaporative and other Properties of Coals," made in June, 1844.

In this coal-field are found extensive beds of mineral, which Professor Rogers calls natural coal; it is a valuable coal, being found by analysis to contain 80,30 of carbon in the 100 grain. Iron ores, in small veins, exist in this locality; but none have yet been discovered of sufficient importance to authorize the erection of smelting furnaces. North of the coal-field, in Spottsylvania and Louisa, there are several large deposites of iron ores. At the places of greatest development, viz. near Louisa court-house, and ten miles west of Fredericksburg, the smelting of these ores is successfully prosecuted. I would here remark, that near the present location of one of these furnaces, on the Rappahannock river, was smelted the first iron that was sent from the colony of Virginia to Great Britain; the furnace was erected by Alexander Spotswood, who was governor of Virginia, in 1710.

The next important deposit is in Buckingham, five miles south of the village of New Canton. In that vicinity a furnace was in operation during the revolution; but was discontinued shortly thereafter. In 1834 the works were rebuilt, and have been since extensively operated. There are other deposits of ore in Buckingham, near Williams mountain, and on the head waters of Stall river. In Nelson county there is one smelting furnace; in Campbell, two; in both of these counties the deposits of ore are extensive. In Patrick Henry, Franklin and Pittsylvania, the production of iron has attracted some attention. Limestone is not abundant in this region; it is found in Albemarle, Amherst, Nelson and Campbell, and also in Patrick Henry and Franklin.

Through this division of the state passes what has been called "the Gold Belt." Commencing in Spottsylvania, it extends through Louisa, part of Goochland, Fluvana, Buckingham, Prince Edward's, Charlotte, and Pittsylvania. Vast sums of money have been expended in searching for the treasures of this region; and, while some rich deposits were occasionally discovered, it has been, upon the whole, a disastrous employment of labor and capital.

Small veins of copper ore are said to exist in Fauquier and Amherst; but I believe they are found to be so minute as to be of no practical use. In Buckingham county, near the Virginia mills, there are extensive quarries of slate, admirably adapted for economical purposes. This is not properly a mineral, but may, I think, with propriety, be mentioned in this connection. There are many other minerals in this region, but they are of that class, interesting only to the geologist.

Throughout this whole district there is a most abundant supply of excellent stone for building; granite, near the head of tide and in Bedford county; with sienite, gneiss, and sand-stone more generally diffused. Middle Virginia possesses another great element of wealth to a people having such resources in coals and iron ore, which form the basis of manufacturing in-

dustry, in the unrivalled water power afforded by her principal rivers, in passing from the great elevation at which their sources are found, to the ocean. At either Fredericksburg, Richmond, Petersburg, or the Falls of the Roanoke, all the factories of Lowell or Patterson might be propelled. These are the prominent points; but along the James River Canal, from Richmond to Lynchburg, there are many localities where manufacturing towns and villages might be located to great advantage. At Lynchburg, being the western terminus of the canal, and the point at which all the iron of Botetourt, Bath, Rockbridge, and Alleghany comes, to be transported to the markets of the Atlantic seaboard, it would seem that these advantages were very attractive; yet but little has been attempted in manufacturing by the citizens of that wealthy, and, in some respects, enterprising town.

I will next glance at the mineral resources of the third great division of the State; that portion so well known as the "Valley of Virginia." For the production and manufacture of iron of the most superior quality, the counties between the Blue Ridge and Alleghany mountains have unrivalled advantages, in abundance of ores, fuel, water power, cheap subsistence for laborers and animals, and a climate as salubrious as any on the globe. The excellent quality of the iron of this region is not mere matter of opinion, but is established by authority of the most conclusive character. The records of the ordnance office of the army and the bureau of ordnance for the navy, bear testimony to the great strength of the cannon made from the iron smelted at the old Clover Dale furnace, and that of Messrs. Shanks and Anderson, both at Botetourt. In like manner the proof boat of malleable iron at the Washington navy yard, sustains the reputation of the Virginia iron manufactured at the Tradegar works in Richmond. Some recent experiments have been made in Boston, by Mr. Alger, so well known as an iron manufacturer, which have resulted in showing that the pig iron from the Roaring Run furnace (also in Botetourt,) is remarkably adapted for all foundry purposes.—Within the last year excellent steel has been made at Richmond from iron manufactured at the Buffalo forge in Rockbridge, of pig metal from Weaver and Newkirk's furnace in Bath county. In Pulaski county, the Messrs. Graham are manufacturing cut nails of superior quality. In Montgomery, Wythe and Washington, bituminous coal is found in the same locality with iron ores of good quality; but no furnaces have yet been erected to use that fuel in smelting these ores.—This coal formation extends into Botetourt, where a vein of four feet has been opened, near the Catawba furnace; but not mined to any extent. In Wythe, lead ores have been smelted with much success. The lead is wagoned to Lynchburg, from whence it finds its way to the northern markets, where it meets with ready sale, and is considered equal to any produced elsewhere in the United States. Extensive beds of gypsum are found in Washington, Wythe, and Granger, which is not inferior to that so extensively imported from Nova Scotia. In Washington county, on the waters of Houlsten river, extensive salt works have long been in operation, and have proved productive investments to their owners, as well as of great advantage to that community.

I will not lenghten this communication by any reflections on this mere enumeration of some of the treasures which Virginia possesses in this delightful valley; nor on the short-sighted policy which causes them, for want of lines of transport to market, to a great extent to remain where nature placed them, but will merely refer to the fourth great division of the State, the Trans-Alleghany counties.

If nature has dealt out her riches with stint to other parts of Virginia, she has dispensed them here most profusely. Western Virginia is like the "the great west." with which she is connected geographically, and in political destiny, is almost superabundantly supplied with all the elements of national wealth.—*Merchant's Magazine.*

Lake Superior Copper Mines.—Lake Superior is four hundred and ninety miles in length, and seventeen hundred in circumference, being the largest body of fresh water known. It contains many islands; one of them, the Isle Royale, is one hundred miles in length, and forty in breadth. Upwards of thirty rivers empty themselves into the lake. The Country about the whole region is poor and not so inviting to the emigrant, as that on the other lakes, yet it can be made to yield fair crops, and can be had cheap. The emigration and improvements, now in progress on the borders of this great inland sea, will eventually lead to the establishment of a few towns and villages. It is, however, the hidden treasures, the Mineral wealth of the Copper region that gives importance to this otherwise sterile soil. A large tract of country, embracing the Mineral district, was purchased by our Government from the Indians in 1842, and the Government having adopted the policy of granting leases to practical miners, of such portions as they should select for their mining operations, which are termed a *location* embracing three miles square, or nine miles of land, and which the proprietor of the lease enjoys the exclusive possession for nine years, upon paying to the government six per cent. of the mineral by way of rent, bids fair not only to enrich the lessee, but to become a source of revenue to the country.

A Company called the *Lake Superior Copper Company*, was formed about a year ago, and the stock is owned by gentlemen in Boston, Washington, St. Louis, &c., who have obtained leases for fifteen locations, said to be rich in Copper ore, and we believe they are now actively engaged in prosecuting their business of mining and smelting.

The *Philadelphia and Lake Superior Mining Company*, also hold leases from the Government for ten tracts of land, each tract embracing one square mile, situate within the region of country on the Southern shore of Lake Superior. Three of these tracts, lie near the Eagle river, and in the immediate vicinity of the Mines already opened and in active operation. The Eagle river locations are known to be rich in mineral wealth, both Silver and Copper; and ores are now being taken from the earth, of a quality much richer than any found heretofore in any part of this richly productive country. Four other of these tracts, are situate on Presque Isle river, embracing lands that have been partially explored, with undoubted indications of a Copper vein, estimated by Geologists as highly valuable. This Company have also three square miles, on the Ontanageu river, adjoining lands taken up by Col. Kinzey, of Chicago, and locations made by Professor Shepherd, of New Haven, and represented by those gentlemen to be very rich and valuable. The Company we understand have made arrangements for the immediate scientific and practical exploration of their lands; opening their veins, and the prosecution of their mining purposes.

Extract of a letter from Col. Charles L. Schlater, U. S. Engineer, to the President of the Empire Mining Company, (No. 16 Wall street,) N. Y., dated

Near Fort Willkinson,
Copper Harbour, May 14th, 1846.

"The news from Eagle River, the Cliff Mines and the Pittsburgh Co., is so favorable as to be scarcely believed,—the ore out in large quantities, estimated as worth *one million* of dollars. Masses of native copper, so far uncovered as to show from ten to twenty tons, have been showing themselves in several mines. *Native silver* is found in some veins in masses, weighing from one ounce to five pounds. You will have heard ere this of the arrival of sixty tons of silver ore from the Pittsburgh Co. They have several hundreds of tons (308) selected specimens ready to barrel as soon as they get the barrels.

New Jersey Copper Mines.—The copper mines recently opened in Hunterdon county, New Jersey, are believed to be very extensive and valuable. The company having charge of them, have expended $50,000 in the purchase of the property, smelting works, excavations, &c., which they are sanguine of receiving back with a large profit on their investment, very soon after they shall have their works in full operation. The ore now being raised from one of the shafts is said to be worth from $150 to 200 per ton.

Iron, Lead and Copper Mines.—A Copper Mine has recently been opened at New Brunswick, N. J. by Mr. Albert Cammaun, of Somerville. It is apparently in the range of the Rocky Hill Mines.

The ores are, the *green* and *blue carbonates of copper*, containing probably about 60 per cent. of metal, and also the *grey sulphuret*, of an extraordinary richness, certainly exceeding 70 per cent. The blue carbonate is a rare mineral, but it is found here in considerable quantity, and of the most extreme brilliancy.

The proprietor is engaged in laying the mine open, and there is every reason to anticipate that it will be found to be a source of great wealth to all parties concerned.

Mineral Treasures of South Missouri.—This country abounds in Iron and Copper; in some places Lead is found; Zinc and other metals are also discovered. In the northern part of Shannon county, red porphyry abounds; it is very hard, and would admit of a high polish. This may, hereafter, become valuable. In the same neighborhood is a hill of chalk. South of this are immense masses of iron, of almost every possible formation.—Near this point, the three forks of Black river unite. Here the traveller has a natural Macadamized road, for the whole country is covered with shattered rock, not longer than a hen's egg, and this state of things continues at intervals for hundreds of miles to the south-west. About a day's journey to the south-west, lies the Current river, and upon it are situated inexhaustible copper mines, which are now suffered to lie idle. These mines afford the sulphuret, the green and blue carbonate, and the red oxide of copper. A few miles from these is found white arsenical copper. Near the mouth of Jack's Fork of the current river. is found cylindrical hematic iron, the bars of which are of the length and size of gun barrels. In this neighborhood and still further down, the country is very hilly, and on the top of almost every hill is found the hemitate iron of the same formation. Rods of iron have been drawn out from this ore in a common blacksmith's shop, and it readily melts with a common blow pipe and candle. Excellent water privileges abound in this neighborhood.

Lower down and nearer the river, high hills of granite rock present themselves; this primitive formation is of a redish color, abounds in many parts of the country, and might be transported by water to the lower country for building purposes. The river here is doubled in size by an immense spring that issues from the base of the granite hills. Below this point it is navigable for flat boats of a large size; many of the hills of this country are nearly covered with chrystalized quarts, which glitter like diamonds in the sun. Hills covered with these chrystals, and with fragments of silicious limestone, jasper and chalcedon, relieve the eye of the traveller as he descends the Current river.

Lead Mines.—The Cincinnati Commercial says: "We notice in the papers an account of the discovery of a lead mine on the Ohio river, Illinois side, some twenty or thirty miles above the mouth of the Cumberland river, at a place well known to the boatmen as "Irish Jemmy's," It is stated that operations for getting out the ore have been commenced, that smelters have arrived from Galena, and are putting up furnaces, and expect in a few weeks to turn out lead rapidly. It is also said that the ore is equal to any at Galena, the prospect good, and that the ore contains a larger quantity of *silver* than any lead in the country. The mine, the account continues, was accidentally discovered by men engaged in digging a well, and that they went through a vein two feet in thickness. These are all the particulars we have seen of this new lead mine, which, if true, are of considerable importance. These mines will be a source of great profit, if as good as represented. It is improbable that in time many valuable mines will be discovered on the Ohio. There is a tradition well known to the citizens about the Falls of the Ohio, that a silver mine exists near that part of the country, on the Indiana side, where the Indians obtained much pure ore. The red men obstinately refused, for any price, to disclose its location. It is also well known to the old settlers, that the Indians always procured an abundance of lead from some in the "Knobs," as the highlands in that vicinity are called. They were offered large sums to disclose their knowledge of these lead mines, but could not be prevailed upon; no considerations were sufficient to obtain the information desired. Long after the Indians had been driven from the country, numerous persons employed their time and means in searching for the treasures which they knew existed, as specimens had been seen. These mines are yet to be discovered, and no doubt will be in this generation. As in the above case, as civilization and improvements increase, they must be brought to light, for it is scarcely probable that a settlement could be made over a silver or lead mine without discovering it. One of the richest mines in South America was discovered by a shepherd, who, while climbing up the side of a declivity, caught hold of a bush, tearing it up by the roots, when to his astonished vision appeared the rich treasure which has since jingled in the pockets of millions in all parts of the world. It may be that ere long, on the borders of our beautiful Ohio, rich and valuable mines will be discovered, though not as exhaustless as the one above mentioned."

Gold Mine.—A new gold mine, says the New York Sun, has been discovered in Orange county, N. C., in which the "precious metal" is said to be gathered with great facility and ease. Gold is found in great plenty in North Carolina, and yet the State has less real wealth than Vermont; and so it almost always is with States, producing gold instead of iron, lead, coal, &c. Look at the poverty of Mexico, with all her silver mines and territorial wealth. She cannot pay the instalment due under her treaty with the United States. And will it, can it be otherwise with her? An owner of a gold mine picks up the ore, breaks it up, extracts the gold and puts into his pocket and walks off. How does that affect the State? Take for example, the discovery of iron ore. The laborer is paid for digging, furnaces are constructed for melting, blacksmiths are paid for working it up, and the vast product of all this labor is applied to hundreds of uses. Thousands are employed in the manufacture of iron for various purposes. So in lead, and so of coal; but the discovery of gold benefits only the owner. He has the means, it is true, of enriching others.

Wonders of the Lead Region.—It is impossible to conceive the value of the many lead mines recently discovered in Iowa and its neighborhoods. A miner by the name of Booth,

at Dubuque, while sinking a shaft, came out at a considerable distance in a large cave, containing the richest veins of lead ore that had yet been discovered in that country. The cave is 1000 feet in length and 15 to 40 in breadth, and from 12 to 30 feet in height. But the peculiar charm of the cave is in the mineral it contains. Descending by a small shaft on the floor into a drift, the glittering ore reflected back the light in every direction. It lays in detached junks, some weighing probably a thousand pounds, embedded in the usual red silica; but by what wondrous chemisty, and when it was formed, or if it grew, where it gets its constituent parts, are among the mysteries. It is enough that it is there, and in quantities that would gladden the eyes of any miner. It is difficult to form an estimate of the amount of ore the cave will yield. Experienced miners say it is good for three millions, and it may possibly greatly exceed that.

Notes on Mineral Districts in the United States.—The Potomac and Alleghany coal and iron basin lies between two ridges of the Alleghany mountains, at a distance of about 200 miles from Washington. These mountains run nearly parallel, at a distance of four to five miles from each other; the uplifting of which having raised the ends, or out-croppiug of the minerals, induced an eminent geologist to compare them to a number of boats placed within each other; in the centre of which flows the river Potomac and its tributaries, cutting them to the depth of 1200 feet, and exhibiting to view more than twenty strata of coal, and about the same of iron ore, giving an aggregate of more than sixty feet of each, beside limestone, fire-clay, and other minerals; and as there are 4840 square yards in an acre, sixty feet, or twenty yards, in thickness, will give to every acre 96,800 yards or tons—a quantity literaly inexhaustable for practical purposes, and remarkable for its purity and excellence. This, it is believed, is unparalleled in the history of the world, that such a vast body of good ore should lie above water level, and be immediately associated with every material necessary for its reduction on the spot; and more especially, as the strata are worked by drifts, or adits, which drain themselves as the work progresses, without any expense for shafting; and every material necessary to erect works is found there. "The coal" says Professor Daniel, of King's College, "is a beautiful specimen, and perfectly adapted to the purposes of making iron; it makes an excellent coke. I have been unable to detect any pyrites or sulpher in it." It has also been analysed by several other eminent geologists who say it contains—

Carbon, pure coal	82,01
Bitumen	13,34
Peroxide of iron	1,33
Residuum	3,32—1-10

And, by experiments made, it is found superior to the Staffordshire coal for raising steam. The iron ore consists of the brown hæmatite, which has been analysed by D. Musliet, Professor Andrew Ure and others, and yields 60 to 63 per cent. pure iron; the argillaceo, is in balls and bands, 36 to 41 ditto, ditto, the calcareous, with 12 per cent. of pure lime, 22 to 24 ditto, ditto. By a judicious mixture of these ores, iron of great purity, and adapted to the various purposes is made at works now in operation.

A part of this coal and iron basin is in Maryland, and a part in Virginia, the river Potomac being there the boundary between those States. Hitherto, the difficulty of reaching these mines of wealth has rendered them unavailable; but some idea may be formed of their value from the circumstance that the states of Maryland and Virginia have been engaged nearly twenty years in making a canal from Washington to them, on which more than ten millions have been expended and which is now nearly completed. The Baltimore and Ohio Railroad Company extended their road to the same region, at an expense of four millions of dollars. The facility for mining and smelting iron is such, that iron can be made as low as in Wales; while the coal is brought to the mouth of the drift, near the head of the furnace, for 1c. per bushel, being about 13d. per ton; and the transportation to Washington, Baltimore, Philadelphia, New York, &c, is moderate; this, together with the consideration of an import duty on foreign pig-iron of 9 dollars (about 2*l.*) per ton, on bar-iron 25 dollars (or 5*l.* 12s.) per ton, must render this coal and iron region of immense value and importance to the proprietors of those lands, and offers great inducements to iron masters and companies, to transport their means and skill to that region.

The country is highly salubrious; and besides its immense mineral wealth, it is one of the most interesting sections of the United States. The soil is uniformly good, affording a spontaneous growth of "Timothy" (grass,) and the finest pasturage, The arable lands yield heavy crops of wheat, oats, potatoes, &c., and apples, peaches, plums, as well as currants, goosoberries, &c, are very plentiful; the mountain sides are literally matted with several varieties of wild berries. The timber is oak, hickory, pine, &c.; the *magnolia acuminata* is very large and beautiful. Mineral springs have been discovered, and several furnaces have been erected. Cost of transport $3,50 to New York.—*Sun.*

A Diamond.—The Dahlonega (Georgia) Times, of the 23d instant, says:—"We are shown on Tuesday last, a diamond of the first water, about the size of a large pea, belonging to the Rev. Pendleton Cheek, of Henry County. It was found at the Union Gold Mines not long since. Mr. Cheek informed us that several years others had been found at the same place, but not so large as the one shown us. This is a new discovery, and one that promises to open our State vast resources of wealth, as it will give a fresh impetus to the energies and enterprise of those engaged in digging from the bowels of the earth its hidden treasures.

RAIL ROAD INTELLIGENCE.

The effect of rail roads upon population—we mean, of course, the movements of the population—is wonderful. What they all move, go, and come for, he could never tell, although probably, we help to make the very marvel of which we speak. We do not consider rail roads in this State, (Pennsylvania,) as having attained to any considerable effect upon the movements of population. Probably ten times as many in the neighborhood of the line travel as formerly, but that is not enough, and what is more, the lines are not sufficiently numerous to create the effect evident elsewhere—the effect, we mean, upon the movements of the people, and the augmentation of the value of property. Massachusetts, probably, is ahead in all these things, and one must look to her for instructive facts.

We were conversing yesterday, with a scientific gentleman, who had recenty spent some days in Worcester, (Mass.) where several rail roads concentrate, and others are to meet. He drew our attention to a plot of ground which, in consequence of the location of the rail road depot, had increased more than two hundred per cent. in value within four years. We then inquired whether that augmentations was not at the expense of other portions of the town, because if it was, the real benefit was nothing; it was only taking from one man's pocket to put into another's, or perhaps, taking from our pocket to put into another.

Our friend assured us that, in every part of the village, there had been an increase of business, and, consequently, an increase in the price of property. That within a very few years, the number of inhabitants had nearly doubled, and that all these benefits were in the main imputable to the rail roads; and these roads are all profitable to their owners likewise.

But it is said Worcester is the centre of the State, and the capital of a rich country. So it is, and so it always was; but it is on the Great Western Rail Road, on the Stonington route, &c. So it is, and hence so great improvement.

But look at another part of Massachusetts. Take what is called the Old Colony Rail road, running from Plymouth to Boston, about thirty-seven miles; and let it be remembered that Plymouth, Kingston, and Duxbury, lie in a bay, from which they may send vessels to Boston, in from six to twenty-four hours, according to the wind; that Plymouth is only a village, and the other portions, with the exception of Quincy, though called towns, would scarcely be denominated villages. Yet mark the returns of business for fifty-five weeks, ending the 30th of November, 1846. The whole number of passengers transported over the road, and between the several stations, in that time, was two hundred and eleven thousand five hundred and sixty-three, (211,563) more than the population of the whole district, through which the rail road runs. Something of the amount of way travel may be inferred from the following statement.

The number both ways from Boston to each of the following stations, and back, was as follows. We copy from the Plymouth Memorial:

Plymouth,	26,215	North Abington,	11,850
Kingston,	10,276	South Weymouth,	6,553
Plympton,	1,388	South Braintree,	20,007
Halifax,	1,110	North Braintree,	12,848
Hanson,	3,312	Quincy,	48,386
North Hanson,	1,501	Neponset,	6,802
South Abington,	13,149	Dorchester,	14,468
Centre Abington,	5,241		

The number from Plymouth to each of the following stations, and back, both ways, is as follows:

Kingston,	3,386	North Abington,	478
Plympton,	340	South Weymouth,	1,613
Halifax,	577	South Braintree,	871
Hanson,	1,218	North Braintree,	497
North Hanson,	49	Quincy,	1,193
South Abington,	1,664	Neponset,	461
Centre Abington,	1,174	Dorchester,	370

The number of passengers brought into Plymouth from the several stations, and carried out of Plymouth, is 40,106.—*U. S. Gazette, Philadelphia.*

The Maine and Montreal Rail Road.—This stupendous work, in which Maine and Canada are interested, is in progress. The St. Lawrence terminus will extend to the waters of the St. Lawrence, opposite Montreal, and the Atlantic terminus to the waters of Portland. The road is to be built throughout on the same plan, the guage to be five feet six inches in the clear between the rails. The work is to be commenced without delay.

Central Rail Road through Pennsylvania.—Among the great internal improvements of the present age, is the contemplated Central Rail Road through the State of Pennsylvania, to form a continuous route from the City of Philadelphia to the Lakes. We are informed that the Stock is already taken up for this great undertaking, and one so vital to the interests of Philadelphia. We shall in the following number, take a more extended notice of this public enterprise.

Mississippi Rail Roads.—The bill which passed the Senate for the construction of a rail road from Montgomery, Ala., to Jackson, the capital of Mississippi, is one of no little interest to those who are holders of Vicksburg stock. It is to aid in the construction of a continuation of the Vicksburg Rail road to the Alabama line, and will there connect with a rail road from Montgomery, in that State. Mr. Calhoun bore testimony to the importance of the work, which, he said, constituted one of the links in the chain of communication from Maine to the Mississippi, and would leave but two other links to be filled up in order to make the line complete. The road, he said, would pass through the very centre of the cotton-growing region.

The bill provides that whenever the route for the rail road from Jackson, through Brandon, to the western boundary of Alabama, in the direction of Montgomery, in said State, shall be established, there shall be granted to Mississippi, alternate sections of the public land on each side of said road, throughout the said route, from Jackson, through Brandon, to the said western boundary of the State of Alabama; said grant not to extend beyond six miles on each side of said road: the sections which are odd in number being granted to the said State of Mississippi, and those which are even in number being reserved to the United States. The grant is made on the condition that the proceeds of the sales of said lands shall be applied by said State to the construction of said rail road, and to no other purpose whatever. The right of way over the lands of the United States is granted to the State for the construction of the road. The troops and munitions of war of the United States are to be transported free of charge over this road.—*Evening Journal.*

A Rail Road is already built, or in progress from Savannah to near the western limits of Georgia. The whole distance from Savannah to the Mississippi on this route, will be only 670 miles.

A Rail Road from St. Louis to Indianapolis is projected. The advantages of such a road are obvious, it would cut off the large angle formed by the Ohio and Mississippi, and greatly shorten the route from St. Louis east. A large and enthusiastic meeting has been held at St. Louis in favor of it.

Manufacture of Rail Road Iron.—Extensive preparation are being made at South Boston, for the manufacture of Rail Road Iron. One establishment to cover 43,800 feet of ground.

Southern Factories.—An Iron factory has recently been established in Benton county, Alabama, at which they make castings of every description, which are said to be equal in every respect to any brought from elsewhere. They can be sold at seven cents per pound, and yield a handsome interest on the amount invested, while those from abroad sell at 11 cents. There are sixty men employed in the establishment,

whose bread baskets are supplied by the farmers of the vicinity—thus opening a market for articles, which, on account of their employment, they cannot make for themselves.

Important Discovery.—*Instantaneous stopping of a Railroad train.*—The experiment took place in the Rue Chaussee d'Antin, on a model railway constructed for the purpose. The inventor is an engineer, named Alexandre. A model train was let off at different rates of speed, from fifteen or twenty leagues an hour, down a very inclined plane, and yet, notwithstanding these circumstances, the train was checked without the slightest commotion. The break is worked by the conductor of the last carriage, by which means the whole of the carriages, instead of striking each other, have a tendency to retreat. As soon as the breaks of the last carriage have taken their position, those of every other carriage in the train act instantaneously, and by another admirable contrivance the locomotive can, even at the greatest rate of speed, be detached from the train. This is not all. The very act of separating the locomotive provides against accident from its running too far forward; for as soon as it has reached a sufficient distance from the train, say fifty to one hundred yards, it stops. The inventor estimates the expense of adopting his apparatus at a thousand francs for each carriage. A commissioner, appointed by the Government, has witnessed, and, it is said, approved of the experiments.—*Galignani's Messenger.*

MISCELLANEOUS.

Health—Times of Taking Food.—Nature has fixed no particular hours for eating. When the mode of life is uniform, it is of great importance to adopt fixed hours, when it is irregular, we ought to be guided by the real wants of the system as dictated by appetite.

A strong laboring man, engaged in hard work, will require food oftener and in larger quantities than an indolent or sedentary man.

As a general rule, about five hours should elapse between one meal and another—longer if the mode of life be indolent, shorter if it be very active.

When dinner is delayed seven or eight hours after breakfast, some slight refreshment should be taken between.

Young persons, when growing fast, require more food and at shorter intervals, than those do who have attained maturity.

Children under seven years of age usually need food nearly every three hours; a piece of bread will be a wholesale lunch, and a child seldom eats bread to excess.

During the first months of infancy there can be no set times of giving nourishment. The best rule is to satisfy the real wants of the child, but never tempt it to take food to still its crying from pain when it is not hungry.

Those persons who eat a late supper should not take breakfast for an hour or two after rising. Those who dine late and eat nothing afterward, require breakfast soon after rising.

Persons of a delicate constitution should never exercise before breakfast.

If exposure of any kind is to be incurred in the morning, breakfast should always be taken previously. The system is more susceptible of infection and of the influence of cold, miasma, &c., in the morning before eating than at any other time.

Those who walk early will find great benefit from taking a cracker or some little nourishment before going out.

Never go into a room of a morning where a person is sick with a fever before you have taken nourishment of some kind, a cup of coffee, at least.

In setting out early to travel, a light breakfast before starting should always be taken; it is a great protection against cold, fatigue and exhaustion.

In boarding schools for the young and growing, early breakfast is an indispensable condition to health. Children should not be kept without food in the morning till they are faint and weary.

Never eat a hearty supper just before retiring to rest.

It is injurious to eat when greatly heated or fatigued. It would very much conduce to the health of laboring men if they could resist fifteen or twenty minutes before dinner.

Umbrellas.—It is curious to observe the slender thanks given to those who endeavor to increase the comfort and convenience of the human race. When Jonas Hanway, though a very popular character, first appeared in the streets of London with an umbrella, he was looked upon with a similar feeling to that with which the ancient prophet of that name was regarded. The novel example of such effeminacy was ridiculed as quite insufferable; and preferring exposure to the shower of missiles with which he was assailed, he quietly put it down, and took shelter in a cutler's shop, from the back door of which he retreated into an adjoining street, and without further molestation, got safe home. It was some time before he again ventured to defend himself publicly against the sun's rays; but being deemed an eccentric, his singularity was overlooked, and he was permitted quietly to walk under cover. At length so many began to avail themselves of the like accommodation, that the common eye grew familiar to it. A few rurals stopped now and then to gaze and wonder, but felt rather amused than offended. The imitation at length spread from the Bond-street men of fashion to the men of smock-frocks and aprons; and, in our day, there is scarcely any one, however poor, that has not an umbrella. They have become as common as shoes with stockings.—*Exchange Paper.*

New Pavements.—Mr. Horace P. Russ, obtained permission from the Board of Aldermen of New York, to have a portion of Broadway, between Duane and Chamber streets, paved with blocks of granite interlaid with a concrete mixture of his own invention. The plan has been tested and found to work well.

Energy and Industry.—Little more than a year has elapsed since Fall River, in Massachusetts, was visited with a fire that destroyed upwards of two hundred buildings and other property, amounting in value to $600,000—and yet, the whole number of dwelling houses, stores, mechanics' shops, factories, livery stables, churches and school houses, which have been erected since the fire, and which are now in progress, is about three hundred. Some of these are very large and splendid buildings. The population of Fall River, at the time of the fire, was 8,000; now it is about 10,000.

Ventilation of Ships.—Professor Espy's Ventilator, (says the New York Herald,) is now in operation on board the packet ship Duchess d'Orleans, pier No. 13, East River, where its entire efficiency may be witnessed by those interested in ventilation, on Thursday, Friday and Saturday of this

week, from 11 till 2 o'clock. The simplicity of the machine, and its capability of introducing pure air rapidly into every part of the ship, and into every cell of a prison, leaves nothing further to be desired. It is the same plan which is adopted with so good effect by the Senate of the United States.

ANIMALS PRESERVED IN FLUID.—Mr. Goadsby, of London, has a splendid collection in comparative anatomy, preserved in a preparation of his own discovery, after a laborious and extensive research. Prince Albert has been to see it, and Sir Robert Peel, the Premier. The latter presented Mr. Goadsby £150 from the Royal bounty fund, as a reward for his labors in this valuable department of natural history.

LABOR.

BY CAROLINE F. ORME.

Ho, ye who at the anvil toil,
And strike the sounding blow,
Where from the burning iron's breast
The sparks fly to and fro,
While answering to the hammer's ring,
And fire's intenser glow—
Oh, while ye feel 'tis hard to toil
And sweat the long day through,
Remember it is harder still
To have no work to do.

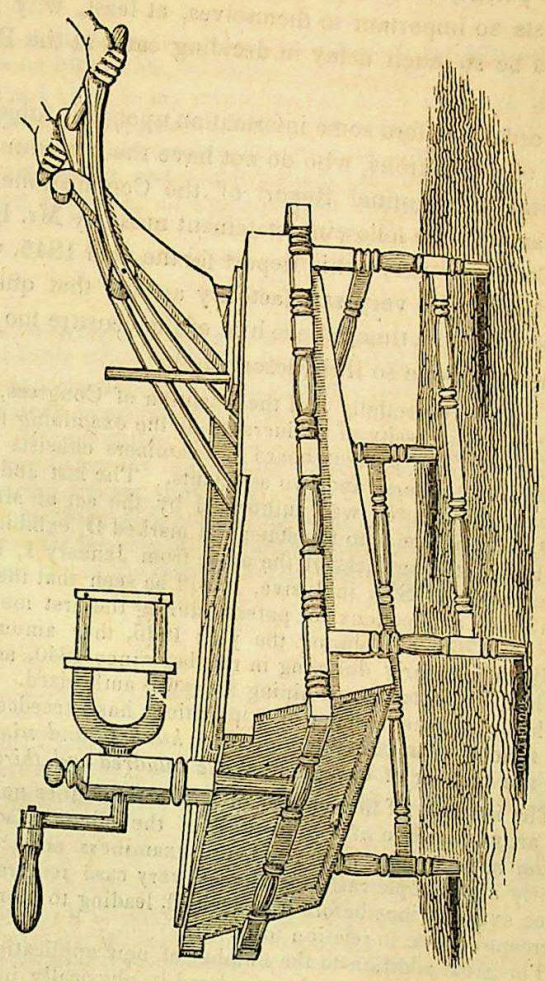
Ho, ye who till the stubborn soil,
Whose hard hands guide the plough,
Who bend beneath the summer sun,
With burning cheek and brow—
Ye deem the curse still clings to earth,
From olden times till now;
But while ye feel 'tis hard to toil
And labor all day through,
Remember it is harder still
To have no work to do.

Ho, ye who plough the sea's blue field,
Who rides the restless wave,
Beneath whose gallant vessel's keel
There lies a yawning grave,
Around whose barque the wintry winds
Like fiends of fury rave—
Oh, while ye feel it's hard to toil
And labor long hours through,
Remember it is harder still
To have no work to do.

Ho, all who labor—all who strive,
Ye wield a lofty power;
Do with your might, do with your strength,
Fill every golden hour;
The glorious privileges to do
Is man's most noble power.
Oh, to your birthright and yourselves,
To your own souls be true!
A weary, wretched life is theirs
Who have no work to do.

WASHING, WRINGING AND CHURNING MACHINES, BY SABIN & HOWE.

Patented, August 16, 1845.



This Machine consists of an oblong box the bottom of which is an inclined position when placed in a frame, which elevates it sufficiently to work with. At the deepest end of the box, or the lower end of the inclined bottom there is a grating, against which the clothes are pressed by forcing against them. A dasher which has its power augmented by means of an inclined plane at the upper end of the box, opposite the grating, a roller affixed to the handle of the dasher, which runs up and down the inclined plane, and forms a fulcrum to increase the force of the pressure and relieve the operator in the process of Washing. The inclined plane can be raised or lowered at any angle desired with an increase or decrease of power, and easily adjusted to persons of any height; the common wringer is connected at the back end of the frame, (which is easily removed at the will of the operator,) for the purpose of wringing large pieces that cannot easily be done by hand. By substituting a churn for the wash box in the frame which is of the same shape, butter can be churned by a similar operation.

These machines will be found to be the easiest to adjust of any heretofore offered to the public, while their cheapness and durability brings them within the reach of the poor as well as the rich, and is fast making them the universal Machines for the purpose. They can be used by a child who can without severe labor perform the work of an adult on any of the ordinary Machines.

THE DELAY AT THE PATENT OFFICE.

It has become a common question among petitioners for letters patent, and a very natural one too, from those having interests so important to themselves, at least, why there should be so much delay in deciding cases at the Patent Office.

In order to afford some information upon that subject, to those of our patrons, who do not have the opportunity of perusing the Annual Report of the Commissioner, we here subjoin the following statement made by Mr. Burke, the Commissioner, in his Report for the year 1845, which we think, will very satisfactorily answer that question, and at the same time relieve him of the censure too apt to be cast upon one so little deserving it.

"I would respectfully call the attention of Congress," says he, "to the necessity of an increase of the examining force of the Office. The present board of examiners consists of two principal examiners, and two assistants. The last addition to the examining force was authorized by the act of March 3, 1839. By reference to the statement marked D, exhibiting the progress of the business of the office from January 1, 1840, to December 31, 1845, inclusive, it will be seen that the whole number of applications for patents during the first mentioned year was 765, and during the year 1845, they amounted to 1,246; thus nearly doubling in number since 1840, and since the last edition to the examining force was authorized. During the last year, the number of applications has exceeded that of any former year, except 1844, *three hundred and ninety-nine*, and the number of caveats filed *one hundred and thirty-seven*.

The increase of the number of applications does not exhibit the actual increase of the business of the office. Each application adds to the labours of the examiners and clerks in nearly a quadruple ratio, as almost every case requires two or three examinations before it is decided, leading to more or less correspondence in relation to it.

The great addition to the number of new applications, during the two last years, has rendered it physically impossible for the examiners to keep up with the business of the office, even with the most arduous and persevering efforts, aided by the experience of years on the part of both of them.

An addition to this branch of the force of the office has, therefore, become imperatively necessary; and if it should not be made, the inventor must be subjected to long and unreasonable delay before his claims can be examined. The crowded state of business during the last year has already occasioned complaints and censures against the office, on the part of impatient applicants, who were not apprised of the causes which prevented the seasonable examination of their cases. These causes were not to be found in the want of industry on the part of the examining force, but in the fertility of invention so creditable to our countrymen, which outstripped the physical capacity of the examiners to perform all the labors which were thus accumulated upon them.

When it is borne in mind that the Patent Office is wholly sustained by duties paid in by inventors—having, since its reorganization in 1836, not only carried on its operations without aid from the treasury, but having each year contributed a surplus to the Patent Fund, a part of which is yearly appropriated for the collection of agricultural statistics and the purchase and distribution of seeds—it cannot be deemed unreasonable on their part that Congress will, with the money thus furnished by themselves, make every necessary provision for its continued efficacy and usefulness.

It is believed that the addition of one principal examiner and one assistant, will be sufficient to enable the office, in the present state of its business, to perform its duties without unreasonable delay. But, if its business should continue to increase in the same proportion in which it has during the past two years, which is very probable, the addition to its force above recommended will not be long adequate to the performance of its duties.

Whether or not provision shall be made for any thing more than the present necessities of the office, is respectfully submitted to the wisdom of Congress.

In connexion with this subject, I feel bound to reiterate the recommendation of my predecessor, made in his last report, in relation to an increase of the salaries of the scientific corps of the office. The office of examiner of patents is one of the most difficult and responsible offices under the government. It requires the highest attainments in the sciences, and a soundly discriminating mind, to which may be added the most unquestionable integrity of character. An examiner should be a living encyclopedia of science, if the expression may be used. His multifarious duties require an intimate and thorough knowledge of the whole circle of science and art, together with a knowledge of modern languages—particularly of the French and German—and the most attentive and incessant mental labor. Yet, for all these high qualifications, and for labors scarcely second in intensity to those required by any officer in the government, the principal examiner is allowed only a salary of $1,500 per annum, and his assistant but $1,250. That it is wholly inadequate, as a compensation for such qualifications, must be evident to every one capable of appreciating the value of the talent and capacity equal to the duties required of an examiner of patents.

That it is not sufficient to retain the services of those capable of filling that place, this office has had proof in more than one instance. During the present year the office has lost the services of one of the most capable and efficient persons who was ever in its employment, and who was induced to resign by the inadequacy of the compensation which he received, and the more alluring prospects held out to him in other pursuits; and in filling the vacancies which have occurred by resignation and promotion in the examining department, since the undersigned has been at the head of the office, he has had to encounter the difficulty of securing the services of persons of the requisite talents and attainments, in consequence of the total inadequacy of the compensation. He has had the mortification of being defeated, in his efforts to procure the services of suitably qualified persons, by a railroad corporation, which was able to pay more for such services than he was authorized by law to pay.

In urging an increase of the salaries of the examiners, the undersigned is happy to find himself sustained by the great body of the enlightened inventors of this country, who desire earnestly that the men who are to pass upon their valuable rights shall be not only men of integrity, but of the highest order of talents and scientific qualifications. They desire that the class of officers to whom the law commits their interests shall be capable of comprehending the many intricate and difficult questions submitted to them; and, as the Patent Office is sustained by a heavy tax on their ingenuity, they feel that it is due to them that a sufficient sum should be appropriated, in the form of salaries, to induce men of the requisite capacity to undertake the various and ungrateful duties of examiners.

PROGRESS OF A POUND OF AMERICAN COTTON.—The following is the history of the travels and adventures of a pound of manufactured American cotton: "The Cotton came from the United States to London; thence to Manchester, where it was

spun into yarn. It was then sent to Paisley, where it was woven; next to Ayershire, to be tamboured; afterwards it was conveyed to Dumbarton, where it was hand-sewed. It was then again sent to Paisley, when it was conveyed to a distant part of Renfrew to be bleached, and then returned to Paisley. It was afterwards sent to Glasgow and finished; and from Glasgow it was conveyed, per coach, to London. From its shipment in America till its arrival in the London warehouse, it must have been conveyed 3,000 miles by sea, and 920 on land. The value was increased 2,000 per cent. by the processes of the manufacturer, whilst no less than 150 people were engaged in its carriage and preparation."

An estimate of the population of the United States—January, 1846, by the Hon. H. L. Ellsworth.

Maine	575,500
New Hampshire	291,500
Massachusetts	817,000
Rhode Island	120,000
Connecticut	320,000
Vermont	298,000
New York	2,626,000
New Jersey	409,000
Pennsylvania	1,960,000
Delaware	79,000
Maryland	485,500
Virginia	1,255,000
North Carolina	760,000
South Carolina	600,000
Georgia	784,000
Alabama	660,000
Mississippi	586,000
Louisiana	440,000
Tennessee	910,000
Kentucky	835,000
Ohio	1,760,000
Indiana	860,000
Illinois	722,000
Missouri	540,000
Arkansas	140,000
Michigan	320,000
Florida	80,000
Wisconsin	100,000
Iowa	115,000
Texas	100,000
District of Columbia	54,000
	19,602,500

PATENTS ISSUED IN JANUARY AND FEBRUARY, 1846.

ELIJAH CONVERSE, Cincinnati, Ohio, Improvement in Machine for SHELLING INDIAN CORN, January 7, 1846.

What I claim as my invention, and desire to secure by Letters Patent, is the before described manner of constructing the case—that is to say, with a circle of inclined radial bars on the underside of the dome, inclining outward and outward from the eye towards the base of the dome, forming with the radial bars of the disk, a circle of triangular shaped cells, for the reception and Shelling of various sized ears of corn—thus doing away with the necessity of having moveable concaves and boards, supported by springs to communicate themselves to the varied sizes of the ears, which springs are liable to get out of order.

JEKIEL T. FAWAND, Port Byron, New York, Improvement in a Machine for DRAWING WATER, January 7, 1846.

What I claim as my invention, and desire to secure by Letters Patent, is the guiding Roller, (for preventing the vibration of the buckets,) in combination with the tilting hook for emptying the bucket, and double right and left hand ropes for suspending the same, all combined and operating as herein set forth.

JAMES MACGREGOR, Wilton, New York, a new Improvement for HEATING APARTMENTS, January 7, 1846.

What I claim as my invention, and desire to secure by Letters Patent, is making the aperture for the escape of the products of combustion in or near the bottom, (not under the fuel, and below the upper edge of the door,) for the purpose and in the manner described. And I also claim the air-passage chamber, and connecting with the fire chamber by the aperture for the escape of the products of combustion, for the purpose and in the manner herein descried.

JOSEPH C. RICH, Penfield, New York, Improvement in a new Machine for CUTTING STRAW, January 7, 1846.

What I claim as my invention, and which I desire to secure by Letters Patent, is the form of the mouth-piece, a face plate in combination with an angular knife, as above set forth.

J. J. MAPES & WILLIAM A. COX, New York City, N. York, a new and improved Apparatus for heating, evaporating, and concentrating fluids evaporating, and concentrating fluids by STEAM, January 7, 1846.

We claim the employment within an evaporating pan, of a series of inclined tubes, in combination with an upper and lower box or tube, the former communicating with the upper end of the series of inclined pipes for the admission of Steam to them, and the latter with the lower end of the series for the discharge of Steam and water produced by condensation as substantially described.

DANIEL GOFE, Rehoboth, Massachusetts, a new Improvement in GLAZING BATS of COTTON, January, 15, 1846.

I wish it to be distinctly understood, that I do not lay claim to this apparatus, as it has been employed for saturating with tar, and other similar substances; battings made of hempen and other course fibres employed in sheathing vessels, &c., the object being thoroughly to saturate the fibres, to cause them to adhere to each other, and to the cementing matter with a view to form as near as practicable a water proof fabric, the object and the fabric being entirely different from cotton and pellips wadding; but, what I claim as my invention, in the process of glazing the fabric, known under the general appellation of pellipse or cotton wadding, is passing it through the glazing liquid at a velocity substantially such as herein described, so as to cover the entire surface and edges, without penetrating to the inner fibres as described.

THOMAS A. DAVIS, New York, a new and Improved mode of constructing a CLOCK or time-piece, January 15, 1846.

What I claim as my invention, and desire to secure by Letters Patent, is suspending the case and parts of a clock or time piece as above described in such a way as that the same will cause the working parts to go in the usual way, thereby saving the expense of the ordinary weights and springs, as the motive power,—*I* also claim the introduction of the pulley as herein described, to regulate the weight between the time and the strike sides.

—

HARVEY W. SABIN, New York, a new and useful Improvement in BEE HIVES, January 15, 1846.

Having thus fairly described my Improvements, what I claim therein as new, and desire to secure by Letters Patent, is constructing the Honey boxes so as to be taken to pieces in combination with covering them in the manner described, with papers set forth having an additional or false top on which the comb is to be built.

—

HORACE H. DAY, New York, a new and useful Improvement in the construction of INDIA RUBBER BOATS or Pontoons, January 15, 1846.

I wish it to be distinctly understood that I do not claim as my invention, simply making Boats of India Rubber cloth with cut inflated cylinders,—nor do I claim simply making boats, with hollow air-tight vessels around the gunwale, as this has been resorted to in Life-boats made of wood or metal,—but what I do claim as my invention, and desire to secure by Letters Patent, is making boats of a sheet of India Rubber or other water proof-cloth attached to a frame consisting of India Rubber inflated cylinders, in manner substantially as herein described.

—

J. W. HARMAN, New York, an Improved method of softening the GUM or INDIA RUBBER, and prepare it for grinding, January 15, 1846.

What I claim as my invention, and desire to secure by Letters Patent, is the softening of India Rubber preparatory to grinding by the use of vapours of either Naptha or turpentine, or Naptha combined with steam as herein described.

—

BENJAMIN F. WOLF, Lansingburgh, New York, useful Improvements in STOVES, January 15, 1846.

What I claim and desire to secure by Letters Patent, is the horizontal passage, between the enter plate of the oven, and the inner bottom plate of the baking apartment, with the opening in and out of the same, together with the provisions, by which the fire and heated air from the fire chamber are made to pass through the same, in the manner, and for the purposes above described.

—

THOMAS HASSAND, New York, new and useful Improvements in the construction of TIMBER BRIDGES, January 15, 1846.

I do not claim the use of cast Iron Shoes, such having been used to receive both the vertical posts, and the braces, and not being capable of effecting the purpose for which I employ them in combination with posts that pass through the lower cheeks.

—

EBENEZER F. GAZZAM, Pittsburgh, Pennsylvania, a new and Improved BEDSTEAD FASTENING, January 25, 1846.

What I claim as my invention, and desire to secure by Letters Patent, is the *projection* or *nut* on the inner surface of the plate now in use, and the peculiar arrangement above described, of the *wooden slats or strips*, by means of which the plate may be permanently fastened into the part with *glue*, thus saving the cost of screws, and the time necessary to put on the plate by means of screws, and at the same time making a more complete and permanent Fastening.

I do not claim the method of fastening the *Rail* to the Post of which the plate described, or represented, constitutes a part, but merely the above described method of fastening the plate itself into the part.

—

MOSES CHASE, Baltimore, Maryland, a new and useful Improvement in the machine for fulling, scouring and washing CLOTHES, January 23, 1846.

What I claim as my invention, and desire to secure by Letters Patent, is the combination of the vibrating back and plates with central dasher, and axle, and panel, let arms and rounds, operating the same, the whole being arranged and operated in the manner and for the purpose set forth.

—

CHARLES BROWNWHITE, New York, Invention of a new and useful vegetable composition, not known or used before, in making of moulds, heads, or handles of any kind, January 23, 1846.

What I do claim as my invention, and desire to secure by Letters Patent, is the before described vegetable composition, for the making moulds, handles, and heads, of every description, especially in the making fringe and taped moulds, parasol and umbrella handles or heads.

—

WILLIAM FOSKETT, Ware, Massachusetts, new and useful machinery for manufacturing HAT BODIES, January 23, 1846.

Having thus explained my invention, I claim the combination with the wind chamber surrounding the conical frame of gauze of the apparatus, which feeds the fibrous material into the chamber, and whips or prepares it previous to the reception therein, the said apparatus consisting of the feeding apron with its spring plate, and bow-strings; the whole being arranged and operating substantially in the manner as above specified and described.

—

JOSEPH V. HEWES, Putnam, Indiana, new and useful Improvements to the double screwing machine used by TINNERS, January 23, 1846.

Having thus fully described my Improved Seaming Machine, for turning down and forming a Seam of the plunge surrounding the bottoms of the buckets, &c. What I claim therein as new and desire to secure by Letters Patent, is the giving to one of the double seaming rollers, a conical plunge in combination with a spring attached to the shaft of said roller, in such manner that the flange surrounding the bottom of a vessel, can be gradually bent down, and the seam perfectly finished at one operation, the parts being constructed, and combined substantially as herein set forth.

—

LATHROP S. BACON, Gennessee, New York, a new and useful Improvement in the manner of combining an elevated Oven with a Cooking STOVE, January 23, 1846.

Having thus fully described the nature of my Improvements, in the manner of combining an elevated Oven with a cooking Stove, and set forth the advantageous operation of the same; what I claim as new therein, and desire to secure by Letters Patent, is the dividing of the wide elevating flue, at the elevated oven,

and of the flue space surrounding said oven, into two compartments by the partition plate, in combination with the dampers, and the cut opening in the flue, the whole being arranged and operating substantially as herein set forth and fully made known.

HENRY C. BILLINGS, Trenton, New Jersey, a new and useful Improvement in the construction of transparent COVERS for stoves, grates and heaters, of every description, January 23, 1946.

HIRAM SEGER, Macon, Georgia, a new and improved method of cutting LADIES DRESSES by aid of diagrams or adjusted patterns, January 23, 1846.

Having thus fully described this my system of forming and cutting the bodies of Ladies' dresses, what I claim as new and desire to secure by Letters Patent, is the form of the patterns, and the arrangement of the graduating open scales, upon the same for the adapting the patterns to persons of different sizes, constructed and operating substantially in the manner and for the purposes herein set forth; I also claim, the several measures taken in obtaining the size of a lady's form, by means of the patterns and scales, so as to shape the different parts of the body of a dress substantially as herein set forth.

Improvement in WASHING MACHINES, by CHARLES KING, of Scipio, New York, patented, January 23, 1846.

The Improvement consists in a combination of a set of Rollers, placed in a cylindrical form, with a cylinder of rollers moving round within them, and having a play by means of elastic springs; whereby the clothes are more perfectly washed, and remain uninjured during the process.

A useful discovery in coloring DAGUERETYPE PLATES, by fixing the colors therein, by FREDERICK LANGENHEIM, of Philadelphia, Pa., patented, January 30, 1846.

The Improvement consists in the colors in the Plate, by means of gum applied substantially, in the manner and for the purpose set forth.

Another Improvement in the process of depositing the colors substantially, as described therein, by causing the finely pulverized particles of color to float in the air over where the plate is placed, which, as they settle, are placed on the uncovered portions of the Plate, in the manner and for the purposes desired.

Improvement in CUTTING STRAW, by SAMUEL G. BLACKMAN, of Norwalk, Connecticut, patented, February 10, 1846.

The Improvement is in suspending the Boxes, in which the journals of the Cylinders run between two set of Springs, placed above and below, the upper set being regulated by temper screws, or analagous device, in combination with the rollers of radial knives that cut against the surface of the Cylinder.

Improvement in making GLAZED COTTON WADDING, by JEREMIAH ESSEX, of Birmington, Vermont, patented, February 10, 1846.

The Improvement is by arranging a series of Carding Machines, one behind another, and over a single apron to form a bat of several thicknesses of slivers, as herein described. And also the arrangement of one or more series of reels that rotate by means of cog wheels or equivalents, to convey the bat in combination with the glazing, or sizing, or drying cotton, or other bat or wadding substantially.

Improvement in the COOKING STOVE, by JOSEPH LAUBACH, of Harrisburg, Pa., patented, February 10, 1846.

In the arrangement of the circular dividing flue in combination with the segment plates, for causing the heat to pass under the sides of the large oven, and thence to the central dividing flue, in the manner and for the purposes set forth.

Improvement in HORSE POWER, by ISRAEL H. RICHARDSON, of New York City, patented, February 10, 1646.

By placing the Master Wheel beneath the main beams, or body of the carriage, in such a manner as that it sustained permanently attached in its place as described, in combination with the placing of the residue of the machinery in a separate frame to turn over upon hinges, or a hinge or piviot as set forth, thereby serving all impediments to its transportation and admitting of the whole being immediately replaced in gear by turning the independent frame, back into its former position.

Improvement in STOVES, by CHARLES M. LEET, Vernon, New York, patented, February 10, 1846.

By causing the draft to pass over the upper edge of the front half of the inner cylinder, thence down between the inner and outer cylinders into the oval cup, and thence down into the semi-circular space between the inner and outer cylinders, and thence to the smoke pipe.

Improvement in WASHING MACHINE, by JOHN H. ALDRICH and OTIS C. FOOTE, of Rushville, New York, patented, February 10, 1846.

By connecting the pounder or rubber of a Washing Machine with the hand lever by means of the two jointed links, to give the required downward and forward motion, whereby the clothes in the box or tub, are rubbed and squeesed, or compressed on the washboard at the bottom against the back, as herein described.

Improvement in OVEN DOORS, by GEORGE W. EDDY, of Waterford, New York, patented, February 10, 1846.

In combining a hollow oven door, or one with flues within it with induction or eduction—openings or passages, in its turnings and bearings, the said openings being for the reception and discharge of smoke into and from the said doors substantially in the manner and for the purpose as herein set forth.

A new and Improved SAFETY VALVE, by JOHN SHORB, Canton, Ohio, patented, February 20, 1846.

What I claim as my invention, and desire to secure by Letters Patent, is the method of freeing the valve by means of the Car and valves, substantially herein described, in combination with the weighted lever, and the apparatus for bringing the same into action, constructed and operating in the manner set forth.

Improved STRAW CUTTER, by JOSEPH W. WEBB, Lockport, New York, patented, February 10, 1846.

In attaching the knives, to the level faces of the flange pieces, to admit of them, and by taking any inclination without bending, in combination with the means of adjusting their cutting edge to the bed cutter or shear, by connecting the

flanch pieces to which they are attached by screw-bolts, passing through elongated holes or slats as herein described.

Improved Self-Acting TEMPLE, to power Looms, by ARNOLD PALMER, New Lebanon, New York, patented, February 10, 1846.

The mode of combining and arranging the parts comprising my self-acting Temple, so that the jaws commence closing on the salvage, while the lathe is advancing towards the filling and firmly holding the cloth at the moment of beating up, open and loose it at liberty to vibrate while the shades are changing.

Improvement in COOKING STOVES, by SAMUEL GRIMES, of Auburn, New York, patented, February 10, 1846.

The combination of the flues having dampers in them, constructed substantially as described, with the dampers for directing the heat around the Stove at will.

Improvement in SAFETY CARS, by JOHN LITTLE, of Johnstown, Pa., patented, February 10, 1846.

The combination of the body of the Safety Car, as aforesaid, in combination with the wheel axles and spring arranged and operating in the manner and for the purpose set forth.

Improvement in dressing MILL STONES, by ELISHA S. SNYDER, of Charlestown, Va., patented, February 10, 1846.

In ridges and furrows tangential to the eye, each furrow gradually *increasing* in *width* and *depth* from the eye to the circumference, being of a triangular shape in its vertical cross section, and every alternate section being omitted from the eye to the circle forming large cavities for the admission of the grain to be broken preparatory to its passing to the long furrows to be ground into flour.

Improvement in STEAM BOILERS, by JOSEPH P. BRISON, Jr. of New York City, patented, February 10, 1846.

The said refrigerator receiving that portion of the water from the condenser, which is not immediately returned to the boiler, cooling the same sufficiently for use in condensing and returning it to the jet for the condensation of the steam from the cylinder.

Improved STRAW CUTTER, by ISRAEL J. RICHARDSON, of New York City, patented, February 10, 1846.

What I claim and wish to secure by Letters Patent, is the use of two triangular edged knives combined in a steam cutting machine.

Improvement in FILTERING WATER and other Liquids, by WILLIAM H. JENNISON, of New York City, patented, February 20, 1846.

In making the double case containing the Filtering medium, so that it can be reversed substantially as herein described, to admit of the muddy discharge of the impurities previously deposited. And, I also claim the employment for the purpose of filtering of a cone of felt or other porous substance, to play within two chambers substantially, that by either recovering the whole apparatus, or the direction of the flow of the water, or other liquids, the cone shall be reversed to admit of the more ready discharge of the impurities from the pores.

SYNOPSIS OF FEES, &c., for Patents in Foreign Countries.

Owing to an error committed on page 5, in the first number of the Mirror, giving the *ordinary* cost of Letters Patent in the British dominions, we take this opportunity to correct the same in the present number:

Note—add the whole matter here in relation to Letters Patent in the British Dominions, as found on page 5, of the 1st number, altering the Fees from $5,50 to

- - - - - -	$550,00
- - - - - -	390,00
- - - - - -	625,00
- - - - - -	200,00
	$1765,00

(For the Mirror of the Patent Office.)

RECEIPTS FOR MIXING METALS.

We take pleasure in laying before our mechanical patrons, the few following valuable receipts furnished us by a correspondent, a practical mechanic, who says "I have with a great deal of trouble, labor and expense, collected a large number of receipts, which I have tried, and can vouch for their correctness, and will take pleasure in furnishing for the "Mirror," from time to time, a regular series, suitable for all branches of business. To the *Machinist*, there is no knowledge more useful, and perhaps no subject less understood, than the proper mode of mixing metals, I have therefore enclosed for insertion in your valuable work, the few following receipts, for their special benefit." P. S. D.

Steel Solder—Silver, 18 parts; Copper, 1 part; Brass, 2 parts.

Hard Solder—Copper, 2 parts, fuse, and add Tin, 1 part.

Soft Solder—Tin, 2 parts; Lead, 1 part, fuse.

Speculum Metal—1st. Copper, 43 parts; Tin, 20 parts, mix. 2nd. Copper, 7 parts; melt, and add Zinc, 3 parts; Tin, 4 parts.

White Metal—1st. Brass, 1 part; Tin, 2 parts; Antimony, 4 parts. 2nd. Lead, 20 parts; Bismuth, 12 parts; Antimony, 1 part, fuse.

Prince Rupert's Metal—Copper, 2 parts; melt, and add Zinc, 1 part.

A Metal that resembles Silver—Copper melted with Tin; about three quarters of an ounce of Tin to a pound of Copper, will make a pale bell metal, that will roll and ring very near to sterling Silver.

Sheathing for Ships—Copper, 98 parts; melt at the lowest possible heat, then add Tin, 1½ parts.

Silver Solder—1st. Silver. 19 parts; Copper, 1 part; Brass, 10 parts, and melt together. 2nd. *for plating*—Silver, 2 parts; Brass, 1 part, mix.

Brass Metal—Copper, 3 parts; melt, then add Zinc, 1 part.

Button Maker's fine Brass—Brass, 8 parts; Zinc, 5 parts; mix.

do common do—Button Brass, 6 parts; Tin, 1 part; Lead, 1 part; melt.

Bright Brass colour—Brass reduced to fine powder.

Red Brass colour—Copper filings, 3 parts; Bole, 2 parts; mix.

Fine Brass—Copper, 2 parts; Zinc, 1 part; mix.

Brass for Wire—Copper, 34 parts; Calamine, 56 parts, mix.

To Brass plates of Copper—The plates to be previously sufficiently heated, and then expose them to the fumes of Zinc.

German Silver—Nickle, 1 part; Zinc, 1 part; Copper, 2 parts; this alloy forms an excellent substitute for Silver.

Fine White German Silver—Iron, 1 part; Nickle, 10 parts; Zinc, 10 parts; Copper, 20 parts; mix.

German Silver for Castings—Lead, 3 parts; Nickle, 20 parts; Zinc, 20 parts; Copper, 60 parts; mix.

German Silver for Rolling—Nickle, 5 parts; Zinc, 4 parts; Copper, 12 parts; mix.

Genuine German Silver—Copper, 40½ parts; Nickle, 31½ parts; Zinc, 25½ parts; Iron, 2½ parts; 100 mix.

Common Gold—Spanish Copper, 16 parts; Silver, 1 part; Gold, 2 parts, melt together.

Ring Gold—Spanish Copper, 6 parts; Silver, 3 parts; Gold, 5 parts; mix.

Gold Solder—Pure Gold, 6 parts; pure Silver, 1 part; pure Copper, 2 parts; melt together.

(To be Continued.)

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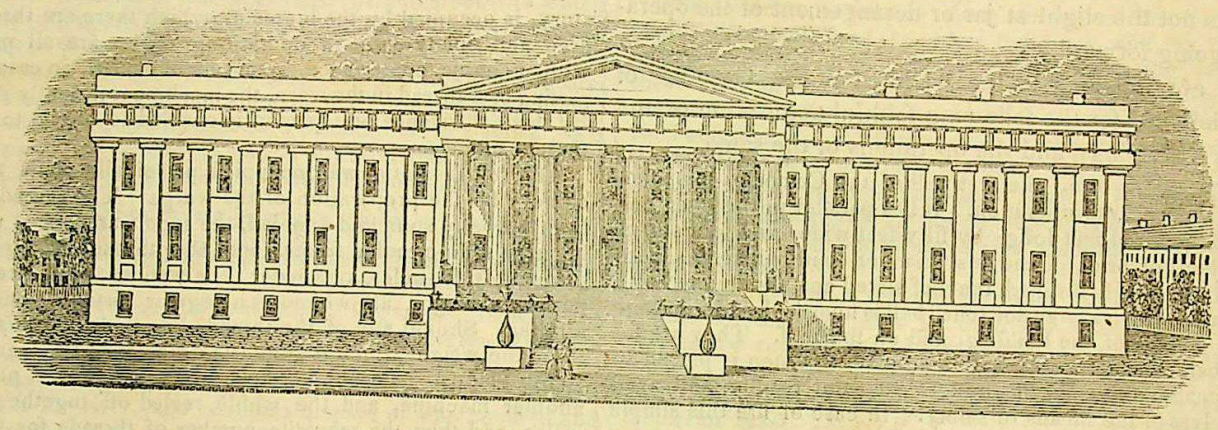
THE MIRROR OF THE PATENT OFFICE, AND AMERICAN JOURNAL

OF IMPROVEMENTS IN THE USEFUL ARTS.

WASHINGTON CITY, D. C.



PATENT OFFICE.

SKETCH OF GLOUCESTER, NEW JERSEY.

SEAT OF THE WASHINGTON MILLS.

The Town of Gloucester, or *Gloucester Point*, as it has of late years been called, is situated on the Eastern banks of the Delaware River, in the State of New Jersey, about three miles below the City of Philadelphia, and opposite to the same. Although in the early history of the American settlements in this vicinity, Gloucester was a town of considerable note, yet, until the recent purchase made by the Washington Manufacturing Company, where they have located their Factories, as represented by the accompanying Plate, it has remained in apparent obscurity. Indeed, so much so, that hardly a vestige of this once thriving town is left to mark its ancient whereabouts; and it would scarcely have occurred to the mind, that such a spot existed, had it not, from its peculiar location, become a public resort for denizens, during the summer months; commanding as it always does, cool and refreshing breezes, both up and down the river, and affording a delightful marine prospect; including also, a picturesque view of the city of Philadelphia and its environs in the distance.

It is to the Washington Manufacturing Company, that now belongs the merit of once more resuscitating "Old Gloucester," and causing it "like the fabled Phœnix to arise from her ashes more beautiful than ever," and to become one of the most busy manufacturing towns in the State.

Instigated by the favorable results of the Tariff of 1842, a number of wealthy Merchants, of the City of Philadelphia, formed a capital of $500,000, with a view of erecting mills for the production of the finer kinds of Cotton Shirtings and Printing Cloths.

After due consideration, Gloucester, from its contiguity to Philadelphia, its healthy and commanding location, and the many other advantages, that rendered it an eligible seat for Manufactures, was selected and purchased in part, by the Company; and now, where but a short time since was found a barren waste, are seen beautiful and capacious buildings devoted to Manufactures, and the busy hum of industry, the "not unpleasant crash of looms and spindles, the heavy strokes of the trip hammer, the grating of the saw, and all the varieties of sound which indicate the progress of active industry are heard, and the sight gratified with cheerful faces, and busy hands; with health too, upon the cheek, and apparent contentment at the heart."

The Factory buildings were planned and erected under the supervision of Mr. William Melcher the present efficient superintendant, who also, selected, arranged, and put into operation its machinery, all of which will challenge a comparison with any in the country, for its beauty or effectiveness in production. While ample guards have been carefully set against injury to the buildings, wise provisions have also been made for the comfort and health of the operatives, and there is not in any of these spacious departments, the slightest object to offend the eye; and so perfect is the organization and administration of the various departments of business, that though over three hundred persons are actively employed, there is not the slightest jar or derangement of the operations going forward.

We are indebted to the "United States Gazette" of Philadelphia, for the following faithful description of the Factory buildings, and the operations of the same.

About a year ago, the first mill of the Company was completed and put into operation. It lies parallel to the river, and is three hundred feet long, by fifty feet wide, and four stories high, built of brick in the best manner, with numerous windows handsomely finished, the roof slated and surmounted by a Cupola, in which a large fine toned bell is hung. Iron ladders are placed outside of the building, and on the roof. They are located before windows, and at each window a step is placed so as to enable those in the mill to step out readily and avail themselves of the means of safety. In case of fire this simple safeguard would be invaluable.

On the river side of the mill, and connected with it by a passage in the construction of which no wood is used, is a large square brick building solidly erected, in which are placed the boilers of the steam engine, and that portion of the cotton machinery from which danger is feared. It is divided by a wall, and in the upper story of the southermost half is placed the Picker machine,

The Cotton when taken from the bale, is thrown into this Machine and passes round a barrel, from which spikes project, in such a manner as to permit longer spikes attached to a rapidly revolving wheel to pass between them. By this means the matted cotton is torn apart, and it then passes under a drum covered with wire, and is drawn through rollers into a circular box, in which a powerful oblong steel frame revolves at the rate of two thousand revolutions in a minute. This is called the "breaker," and the Cotton in passing through it is thoroughly separated, so that the dirt and seeds can readily escape from it. It is then thrown by a strong blast of air, a considerable distance over a rack enclosed in a box, and in its passage all the impurities and foreign substance are detached, and fall through the rack into a receptacle below. The Cotton so cleaned falls into a large bin in the room beneath, from whence it is taken and put into other Picking Machines, where the process of cleaning is gone through with in another form, and the Cotton is delivered in the form of a rough lap, which is neatly rolled up and placed upon the Spreading Machines, where it is again broken and blown. It comes from the Spreaders in a fine smooth "lap," which being wound upon rollers, is conveyed to the Carding Machines which occupy the northern half of the lower story of the main building.

The Carding Machines lay the fibres regularly, and the cotton passing through gatherers and rollers, comes forth in a thin plat which falls into a trough placed for the purpose before the range of machines, and the whole of the plats are gathered at once into the bins. In order to ensure the perfect accomplishment of all that is desired in the primary phases of preparations, the Company have caused a second series of Carding Machines to be erected, and the cotton taken from the first cards is passed over to the second, by which the fibres are more evenly laid, and all the imperfections eradicated so far as machinery can accomplish it.

It would occupy too much space to describe the various operations by which the Cotton so prepared is drawn into thread; twisted, reeled, spooled and made into bobbins ready for the loom. Most of these processes are performed by the "Self-Acting Mules," of which there are twenty-four in operation, with six hundred and eight spindles to the Mule—making in all nearly fifteen thousand spindles. These "Mules" perform the work admirably, and one man is enabled by the simple but perfect adjustment of the machinery, to attend with ease, to a large number of spindles.

A portion of the lower story and the whole of the second story, is occupied by the looms of which there are three hundred and ninety-eight in operation. These are all provided with a simple contrivance, by means of which, in case of the parting of a thread in the warp, the machine is instantly stopped. By this contrivance one person is enabled to attend to two or three machines.

The fourth story was occupied principally with the machinery for the preparation of the warps. The thread having been properly spun and spooled, the spools are placed vertically in a semi-circular frame, and the threads being passed through eyelet-holes, and under little weights, each thread supporting a weight, are wound at a regular distance apart, upon a roller. Should any of the threads break during this operation, the weight which it supports drops, and the machine instantly stops. Three of these rolls are again placed in another machine, and the whole reeled off together upon a roller, and thus the requisite number of threads for the warp is obtained.—While undergoing this last process, the threads are carefully brushed and smoothed, and when a length of warp sufficient for a "cut" is reeled, a bell rings, and a little piece of red thread is tied on the outermost thread. As payment for weaving is regulated by the number of "cuts" woven, it becomes necessary, therefore, for the persons attending the looms to have these marks. A "cut" is equal to about thirty yards, we believe.

We saw also a very rapid manual operation, by which warps are connected, so as to obtain a greater continuous length, and we likewise saw a number of girls busy in drawing the threads of the warp through the "reeds," and so giving it its final preparation for the loom. When the cloth is finished, it is taken to a small room in the first story, where it is properly folded and prepared for the warehouse.

The machinery of this vast establishment is driven by a low pressure engine of one hundred and forty horse power, made by Messrs. Morris & Co. of this city. It rests upon a handsomely ornamented iron base, and many of the working parts are so highly polished and accurately finished, that the engine looks like a costly toy. It moves silently and easily, and is worked, at present, up to about one hundred and twenty horse power. It cost $14,000, and as a specimen of faithful workmanship will bear the closest comparison.—We may say here that the shafting throughout the whole building is of the most approved kind.

This mill cost, in the purchase of site, buildings, machinery, etc., about $203,000.—The blocks of dwellings and stores which are erected in the rear of it, cost $53,000—and to erect the mill alone, grade the ground, etc., occasioned an outlay of $54,000.—Near the mill, and between it and the river, is a gas works erected at a cost of $4000, in which Gas is made from rosin. Six retorts are set, and a sufficient quantity of gas can be produced from it to meet the wants of the Company.

On a line with this mill of which we have spoken, is another one of exactly similar dimensions, which will, in a short time, be in full operation. As a portion of the fabric rests upon piles, it has of course created an additional expense. It is now finished and a part of the machinery already placed in it—and in the course of a few months, it will be in active operation. The engine of this building, was constructed by Messrs Merrick & Town, whose reputation are two well known to require comment.

We have but imperfectly touched upon the matters of interest connected with this Company's works, but have said sufficient, we hope, to afford an idea of the nature of the operations connected there, the great interests involved, and the direct benefit it confers on the large number of operatives engaged. We might continue to trace the progress of these manufactures from the mill to the bleaching works, the print works, the warehouse and the store, and from each phase of their progress derive proofs of the direct and palpable benefits which not only the operatives, but the community derive from this investment of capital.

The mills of the Washington Manufacturing Company, each week send forth a quantity of fine cotton cloths, which, if stretched out, would extend a distance of *five miles*. All these goods are printed as sold in our city, and of course, the labor directly benefits a large number of operatives.

GLOUCESTER MACHINE COMPANY.

Among the other huge edifices which have been erected, are the works of the GLOUCESTER MACHINE COMPANY, whose spacious machine shops, forges and foundry are located to the north of the mills of the Washington Manufacturing Company, as represented also in the plate.

The main building, occupied as a machine shop, is located parallel to the river, and occupies a space of one hundred and sixty feet in length, by fifty feet in width, and is three stories high. The first story is completely filled with machinery of the most approved character, combining all the latest improvements which go to ensure perfect finish and accuracy in the production of machinery.—Among these are self-acting lathes, machines for planeing iron, for drilling and boring, for cutting screws, for polishing iron, and various contrivances which ingenuity has perfected to aid the mechanic. In one part of the apartment we saw a machine for cutting the teeth in cog wheels, which by a nice mathematical adjustment is made capable of cutting the teeth to any required size or angle.

Most of the machines were occupied in the production of shafting, looms and carding machines for the new mill of the Washington Company; and judging from the finished and unfinished specimens set up, we should say they could not be excelled.

The second story is devoted to the preparation of the wood work of machinery, and here again by a combination of machinery, the various operations of rough and smooth planeing, boring, morticing, and tenoning, etc., are performed entirely by the aid of steam; and we saw frame work prepared to be put together, upon which but a very trifling amount of manual labor had been expended—and yet so accurately had the work been done that it looked as if careful hands had, at every phase of its progress to completion, carefully wrought it into the required form and dimensions. The rapidity with which work was completed was astonishing.

In a portion of this apartment we saw a large number of carding machines and looms set up and in progress to completion. Most of them were also intended for the new mill of the Washington Company.

Descending again to the first story, we passed out of the main building into a small room, in which were grind-stones for the various processes of grinding and polishing iron—and from thence to the Engine room, where an engine of forty horse power was performing its work of driving all the machinery of the main building, affording blast for the forges and for the cupola of the foundry, so noiselessly, that if the sight was averted from it, it would be difficult to believe the powerful machine to be actually in motion. The various parts were finished with a perfection of accuracy, and it looked as neat as if kept for show, and not for service.

The building in which the forges are placed adjoins the engine room, and occupies a space of one hundred feet long by forty feet wide. It contains eight forges and two steel furnaces. A powerful fan gives, by means of pipes connected with it, sufficient blast for each forge; and by a new arrangement the flue from each fibre passes down into the ground and passes into a large chimney built on the north side of the building. The effect of this is security, and to ensure a better light within the building. The steel furnaces were in operation, and the workmen were engaged in making spindles.

The foundry, a building about as large as the forge room, stands detached from the other buildings, and the floor was nearly covered with moulds made ready for casting.—Most of these were for cotton machinery, and we observed that in the preparation of the moulds new and improved processes had been adopted, by which the castings are improved in strength, and are brought forth with a smoother surface than is generally obtained, with the same amount of labor. When taken from the mould and scraped, all the castings are placed in a preparation of acid, by which all the scales upon the surface are entirely detached.

Besides the cupola for melting iron, there is also, a small cupola for melting brass by means of a blast, and without placing the components of that article in a crucible, as is customary. The plan is simple, but entirely effective, and does away with much of the trouble hitherto incurred in the manufacture of brass.

All the buildings are constructed in the most durable manner, and the general neatness of all the apartments, show that not only good work is the consequence of the good workmen engaged,—but that good regulations are producing the good order and regularity in the progress of business, which is, perhaps, as necessary for the effective discharge of duties in a large establishment, as is the knowledge of business on the part of the workmen. Two hundred operatives can find room for labor within the establishment.

The Washington Manufacturing Company, have also displayed much taste and judgment in laying out their building lots. The principal streets, which, as well as all others, cross at right angles, are capacious, and running as many of them do, from the river, the town will always be well supplied with a pure and wholesome atmosphere. Many improvements have been made during the present year, by the erection of tasteful private dwellings and cottages, and also a school house; and extensive preparations are being made for further improvements. In fact, this now thriving little community will soon bear a comparison with any of the New England villages, which it much resembles.

A large Hotel is now in course of erection at the Steam Boat landing, below the Company's Works, handsomely situated upon the banks of the river. As it will afford a very delightful water prospect, together with the refreshing breezes of the Delaware, it will no doubt, be much resorted to as a summer retreat.

REMINISCENCES OF OLD GLOUCESTER.

The few following "Reminiscences of Old Gloucester," have been politely furnished us by Mr. Isaac W. Mickle, of Camden. As the origin of noted localities often become a curious question to the enquiring mind, their perusal will no doubt be found of interest to our readers, we therefore, take pleasure in inserting them here.

"The first settlement upon the eastern bank of the Delaware," says Mr. Mickle, which I have collected from the "*author of Reminiscences of Old Gloucester,*" "was made by Captain Cornelius Jacobese May, sailing in the employ of the Second West India Company of Holland. To this company the States General had in 1621, granted an immense tract of territory upon the seaboard of America, which they claimed by virtue of the occupancy of Henry Hudson, an Englishman, bearing their flag, and the first European who landed upon our shores. Captain May brought with him a number of persons, and all the necessary means for building a colony.

He entered Delaware Bay, in 1623, and gave his name to the Jersey Cape. As the place for his settlement, he fixed upon Hermaomissing at the mouth of the Sassackon, the most northerly branch of the Gloucester River or Timber Creek, as the English afterwards called it, "from the great quantities of curious timber," says old Gabriel Thomas, "which they send in great floats to Philadelphia." Here he built a fort of logs, and named it Nassau, in honor of a town in the circle of the Upper Rhine in Germany. This fortification doubtless seemed formidable to the Indians, who beheld with seeming indifference, the felling of their ancient Forests, and the upturning of their useless fields.

How long May occupied Fort Nassau, or what was the cause of his departure, history and legend tell us not. We only know, that the next ship that was sent up the Delaware, found the post in the possession of the Savages, and the country entirely deserted by the Europeans. The Captain, wherever he steered, bore with him the esteem of the natives, who long contrasted his good conduct with the cruelties and wrongs of his successors, and wished that he had never come among them, or that he had staid forever.

"The precise locality of Fort Nassau, is a matter of much debate among the antiquarians. The best opinion seemed to be that it was situated immediately upon the river at the Southern extremity of the high land butting upon the meadows north of the mouth of the Sassackon or Timber Creek. That position would have struck the eye of an enquirer; inasmuch as a fortress thus situated could have commanded both the river and the creek, while it would have been greatly secured from the attacks of the Indians, by the low marshy land which surrounded it upon all sides but the north. Some of the cabins which constituted the town of Nassau, are supposed with much reason to have stood near the mouth of the Sassackon. Remains of buildings have been discovered upon the east bank of that stream; and a peculiar little blue flower which the farmers call *the Dutch flower*, still grows thereabouts. Perhaps, centuries hence, some delver into the bowels of the earth, will strike among the broken pipe stems of Mynheer, and reveal to the world the long forgotten spot.

"After the surrender of Tinicum and the adjacent possessions of the Swedes to the Dutch, under the famous Stuyvesant, a few houses were added under the walls of the Fort at Gloucester, and the whole was honored with the name of the town of Nassau. Other houses were also built along the river shore, for some miles above and below the town; the inhabitants trusting to the reduced numbers and subdued spirit of the Indians for that peace, which they had formerly secured only by seeming ever prepared for war. The natives being incited to vengeance by the remembrance of the wrongs they had received at the hands of the Dutch, fell upon the new comers, did them great injury, and at length, says Campanius, a Swedish clergyman, and writer of that day, "took them by surprise, and destroyed their town and habitations to the ground." The revenge of the Indians was not visited solely upon the settlement at Gloucester, but several of the houses which dotted the east bank of the river in the neighborhood of that place were assailed at the same time, and the inhabitants, at least, in some instances murdered. The remains of one of these outposts, built in part of sturdy square bricks, such as are made only in Holland, were visible a few years ago, at a point a short distance north of Newton Creek. Among the ruins, there were pipe stems in abundance, charred wood, and glass, many colored from the effects of the fire. Amidst these were found a small copper Swedish coin of the Reign of Charles X, who ascended the throne in 1654, and an insepult human skeleton, the skull of which was pierced in the back part as if with a bullet; the whole revealing with dreadful certainty one of those tales of horror and blood with which ancient times were too familiar to think them worthy even of being recorded.

The Indians residing between Timber and Cooper's Creek, were the Armewamexes and Maroahkongs, who belonged to the great family of the Delawares, or as they called themselves, the Lenni Lenapes, or First People. Bravery, generosity, firmness, and an indomitable love of liberty, were virtues which the tribes on the Delaware, shared with their whole race; but in shrewdness, integrity, depth of love, and susceptibility to the finer feelings of human nature, they were far ahead of their brethren. Campanius pronounces them "the most sensible nation in all America," and William Penn says, "He will deserve the name of wise, that outwits them in any treaty about a thing they understand."

To Timber Creek, they gave the names of Letamekanchy-Ril, Arwames, Tekoke and Sassackon, and to Newton Creek, that of Quinquorenning. Gloucester Point was called originally, Tekaacho, or Hermaomissing, and afterwards Arwames.

"On the 2nd of March, 1676, the trustees of Edward Billinge. one of the original proprietors of New Jersey, sold to five considerable persons in the county of York, England, "certain privileges for a town to be built, whereby they have liberty to choose their own magistrates and officers, for executing laws according to the Concessions, within the said town." This contract was ratified by the Concessions which followed in four days afterwards; and the Yorkshire men were thereby allowed the first choice of the tenths into which the province was to be divided; the second choice to any other company who should purchase ten proprieties or actions. Immediately afterwards, a company of Friends in London, purchased a patent for another tenth; the commissioners appointed by the Proprietors being divided into two committees, who were respectively to fix upon the tenth to be occupied by the two companies. The Yorkshire men, immediately after their arrival in 1677. chose from the falls of the Delaware down; while the London men took possession of the country about Arwames or Gloucester Point.

"The first purchase was made, according to the minute of the deed in the office of the Secretary of State in Trenton, on the 10th of September, 1677, of the land lying between the mid-streams of Rancocas and Timber Creeks, and bounded on the east by a right line drawn between the uppermost head of each stream. The consideration stipulated by the Commissioners was literally as follows: "fforty six fladome of duffels, thirty blankets, one hundred and fifty pounds of powder, thirty guns, two hundred fladome of wampum, thirty kettles, thirty axes, thirty small howes, thirty awls, thirty needles. thirty looking glasses, thirty pair of stockings, *seven anchors of brandy*, thirty knives, thirty barres of lead, thirty-six rings,

thirty Jewe's harps, thirty combs, thirty bracelets, thirty bells, thirty tobacco tongs, thirty pair of scissors, twelve tobacco boxes, thirty fflints, *tenne pewter spoonfuls of paint*, one hundred fish hooks, and one grosse of pipes."

"On the 26th day of May, 1686, the proprietors, freeholders, and inhabitants generally of the territory lying between the Pensamkin and Oldman's Creek, met at Arwames or Gloucester, and formed what may be termed a County Constitution. This curious instrument, comprising in all but ten short paragraphs, not only regulated the marking of hogs and other cattle—a precaution to which the absence of fences in those primitive days, gave considerable importance—but erected the two precincts into a county, ordained a regular court, provided officers and prescribed the minutiæ of legal proceedings.

"In 1688, the county court granted a license for a ferry from Gloucester to Philadelphia, and in 1689, the city was laid out by Thomas Sharp, reaching from the Quinquorening or Newton Creek, to the Sassackon or Little Timber Creek,—with ten streets running east and west, and two north and south, and with a famous Market place three chains square. The whole plot was divided into ten equal shares, to correspond with the number of proprietors; and on the east side, in conformity with the good old notions of the fatherland, a space was consecrated to the gambols of the school boys of future ages, under the name of Town Bounds.

"It did not escape the observation of the ever vigilant grand jury, that the exigencies of the public required, in addition to the said Market Place and Town Bounds, a jail wherein to lock up the unruly. And therefore, in 1689, a "gaole or loggehouse of fifteen or sixteen feet square" was ordered to be erected, which answered until December 1695, when it was "ordered that a prison be with all convenient expedition built, 16 feet long, 12 feet wide in the clear, and 8 feet high; to be made of loggs, with a floor of loggs, above and below covered with cedar shingles, and a partition in the middle." In 1696, the preceding order was remodelled, and a Court House constructed over the prison. An addition was made in 1708, and it was rebuilt in 1719, which failing from some cause or other to please the justices and freeholders, was directed to be "pulled down to the lower floor, and rebuilt upon the same foundation with good fresh lime and sand."

"Old Gabriel Thomas writing in 1698, says: "There is Gloucestertown, which is a very fine and pleasant place, being well stored with summer fruits, as cherries, mulberries and strawberries; where young people come from Philadelphia in the wherries, to eat strawberries and cream; within sight of which city, it is sweetly situated, being about three miles distance from thence."

Old Mixon, writing ten years afterwards, says: "Gloucester is a good town, and gave name to a county. It contains one hundred houses, and the country about it is very pleasant." And other authors in the last century, also give this town notable mention for the beauty of its buildings.

"There was at Gloucester a chalybeate spring, which in olden time was much resorted to by the citizens of Philadelphia. Between the young people who were attracted by the forementioned strawberries and cream, and the oldest fry who sought health at the Spa, the ancient hotels at the point used to be lively enough. Occasionally, too, during the fashionable season, the provincial governors and their suites, came down to attend the sessions; and no doubt the levees of their excellencies in point of style would have done honor even to the present day.

"In later years, the ferry house at Gloucester Point, kept by William Hugg, became quite celebrated as the rendezvous of the Gloucester Fox hunting Club. This association was formed in October, 1760, by twenty-seven gentlemen of Philadelphia, who were subsequently joined by several Jerseymen. So fond were some of the Pennsylvanians of their sport, that they have been known, when ice obstructed the crossing of the Delaware, to bring their horses over Trenton bridge, rather than miss the chase.

"On the evening of the 25th of November, 1777, a spirited affair took place on the King's Road, between Big and Little Timber Creeks. Lord Cornwallis, with about four thousand men, and abundant military stores, had been encamped at the Point, but was about moving across the Delaware. General Greene, with a considerable body of Americans lay at Haddonfield, and kept a close watch upon Cornwallis. Lafayette volunteered to reconnoitre the British, and attack them if it seemed desirable. "After having spent the most part of the day," says that gallant Frenchman, "in making myself well acquainted with the certainty of the enemy's motions, I came pretty late into the Gloucester road between the two creeks. I had ten light horse, almost one hundred and fifty riflemen and two pickets of militia. A scout of my men under Chevelier Duplesses went to ascertain how near to Gloucester were the enemy's first pickets, and they found at the distance of two miles and a half from that place, a strong post of three hundred and fifty Hessians, with field pieces, and they engaged immediately. As my little reconnoitreing party were all in fine spirits, I supported them. We pushed the Hessians more than half a mile from the place where the main body had been, and made them run very fast. British reinforcements came twice to them, but very far from recovering their ground, they always retreated. The darkness of the night prevented us from pursuing our advantage." It was on this occasion that Morgan's riflemen, drew from Lafayette the notable compliment, "I found them even above their reputation." These brave fellows were commanded by Lieut. Col. Butler. The Americans had only one man killed and six wounded. The British had twenty killed, many more wounded, and lost about twenty prisoners.

Many other incidents of skirmishes, escapes and adventures are related, as having occurred in the neighborhood of Gloucester in the Revolution; but we find that to gather any thing like a satisfactory account of them is now impossible.

After the removal of the public business from Gloucester, that town begun speedily to decline. Instead of the hundred houses, which it contained at the beginning of the last century, we all remember when it hardly had a dozen. The Old Court House which stood on Market Square, was burnt down; the Market Square itself was turned into garden ground; the streets were ploughed up; and desolation sat every where upon the once thriving city. Governors no longer made it their residence—fashion no longer drew thither its votaries. Now and then, perhaps, a traveller crossing at the ferry stopped for an hour to indulge in recollections of the past—to quote snatches from the Deserted Village, and draw a moral therefrom.

NAVIGATION.

But few inventions were presented to the Patent Office, during the years, 1844–5, upon the subject of Navigation or Marine implements.

Among the most important, perhaps, is the improved manner of making Sails, for which Letters Patent were granted to James Maull, *of Philadelphia, Pa.*, December 11th, 1845.

This improvement consists in the principle of the Horizontal seam in lieu of the vertical, hitherto in use, and

adapted equally well for Cotton, as any other Canvass; "or cutting and making the Sails of all kinds of Vessels with the warp of the Cloth and the seams in a horizontal direction," (vide claim) as exhibited in the accompanying Plates, (I.) (II.)

By this method, according to Mr. Maull, who has politely furnished us with the subjoined statement of his system, the following results are obtained, viz:

1st. The seams crossing the narrow way of the sail, and being more numerous, act as so many bands, that stiffen, strengthen, and prevent it from bellying; (as sailors term it,) thereby flattening the sail to such a degree, that experience has shown a vessel will lie much nearer the wind; and as there is less back sail than on the old plan, a vessel will sail faster when close hauled.

2d. In consequence of the seams running horizontally, the Reef bands are formed by lapping the cloths sufficiently to receive the Points; thereby, making a partial saving. Very large sails, like those on other plans, would require a double reef band, by dispensing with the old fashioned bands, which increase the weight and much injure and cut the body of the sail wherever sewed on, without adding proportional strength. In Reefing or furling sails of cotton, or other stiff, heavy, narrow duck, the horizontal seams fold smooth and easy on the yard, without breaking; whereas, on the old plan of vertical seams, each one has to be folded the whole width of the sail several times, and require more strength and exertion.

3rd. In hauling out the Reef Tackle and Ear-rings of sails made on the old plan, it is well known to sailors that the strain draws heaviest on the woof, or width, of cloth; acting on the weakest parts and frequently splitting the same when partially worn; whereas, by our new method of running the cloths horizontally, the reef tackles, ear-rings, &c., take the strain upon the warp, or stronger portions, and are less liable to be torn. The mode of cutting sails on our plan, is much more simple than the old one, and with a less waste of duck or other material.

Finally. Experience has demonstrated that our sails are less liable to burst in heavy weather, will last longer, and are superior in every point of view to sails made on the old system—all of which we are prepared to prove by some of our first ship Masters, Merchants, and Pilots, who have given them a fair trial.

SYSTEM OF CUTTING AND DRAFT.

(Plate II, *fig.* 1,)

Represents a Ship with full banded Royals, Top Gallant Sails and Courses. Bands extending from clue to ear-ring, cross Topsails, from reef tackle to ear-ring, and from reef tackle to clue on each leech, which forms a double cross; as the reef bands are formed by lapping the seams the width of the bands, the expense of putting them on is avoided; they therefore can be employed in the above manner, to strengthen and improve the appearance of the sails. Should the leech rope part, the canvass would tear no further than the bands, and the cloth could be replaced by inserting the butts under the leech lining to the band. The topsail would be much improved also by putting on bands from the top lining to the head of the sail.

For a Schooner with a full suit, the Jib should be cut so that the ends of the cloth would cut by a thread in the leech, which would possibly give one or two cloths gore in the foot. But in order to put the selvage on the foot of the sail so as to form a reef band, should it cut up the clue two feet, by giving one inch gore in each cloth, (there being twenty-four cloths in the leech,) it will have that effect.

Boom Foresail, generally cut up the clue from two to three feet. In this case, the leech cloths will require one half an inch or an inch gore to the ends of each cloth, so as to form the reef bands by lapping the seams, which should be six or seven inches in width, forming a small sweep to the holes in the band.

The Mainsail is a different cut from a Pilot Boat; the mast and foot being of equal length will give a gore in the foot of eight or ten feet; in this case the leech cloth should be cut straight by a thread, which will give five or six cloths gore in the foot; the seams in the foot should be two or two and a half inches wide, and tapered four or five feet in length, so as to ease the sail as it extends on the foot, and straighten the leech. Reef bands must be put on this sail, and angular bands extending from the throat to the clue. The angle should be carefully measured and cut to its proper dimension.

Schooner Sails where the hoist is much longer than the foot, cut but little up the tack or clue; the wide seams are easily formed for bands by an inch or two gore in the ends of cloth in leech. The angular band is of much importance, it prevents the sail from stretching, sustains the weight of boom with the leech rope, which should it give way, the canvass would not tear across the seams, but along the cloth and would be stopt by the angular band.

The bands in *fore and aft sails*, extending from throat to clue, may be dispensed with, but ought to be applied when the sail is partly worn; and with an additional one from throat to tack, would greatly increase the strength of the sail. The leech of the sail should be tabled, and a band be put on the leech tabling, which would prevent the seams from stretching, and much strengthen the sail.

Signed, JAMES MAULL,
Master Sail Maker, Philadelphia, Pa.

We can bear testimony to several successful experiments made with Mr. Maull's Sails, and take pleasure, in conjunction with several able and experienced Masters with whom we have conversed upon the subject, in recommending them to the general notice of mariners and others interested.

John C. Stevens, Esq., so well known to the Maritime fraternity, has not only expressed himself in highly favorable terms of Mr. Maull's system, but has actually tested the principle with great success, upon his celebrated Yatch Maria, a notice of which will be found on page 56, and which have been much admired by all practical navigators, who have seen her.

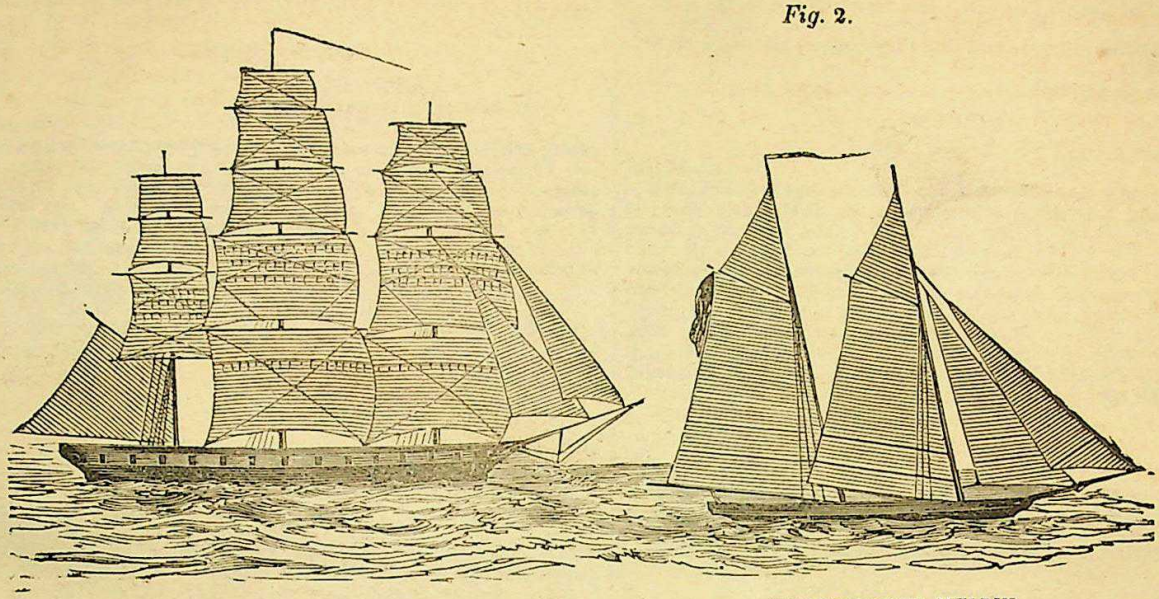
Gen. Cadwalader has also adopted them for his *Yatch Janette*, and in a letter to Mr. Maull expresses himself in the following words—"It affords me much pleasure to say that the suit of Horizontal Sails made by you for the Yatch Janette, which I have used this season, lay flatter and closer to the wind than the vertical sail heretofore used. I find them strong and easily managed in heavy weather, and am perfectly satisfied with them, and do not hesitate to recommend them."

The Pilot Boats W. W. Whilden and Henry F. Merkin, on the Delaware, have also used these sails, for eighteen months or more, and the Pilots generally have expressed their favorable opinion of the same in the subjoined Certificate.

PLATE, II.

Fig. 1.

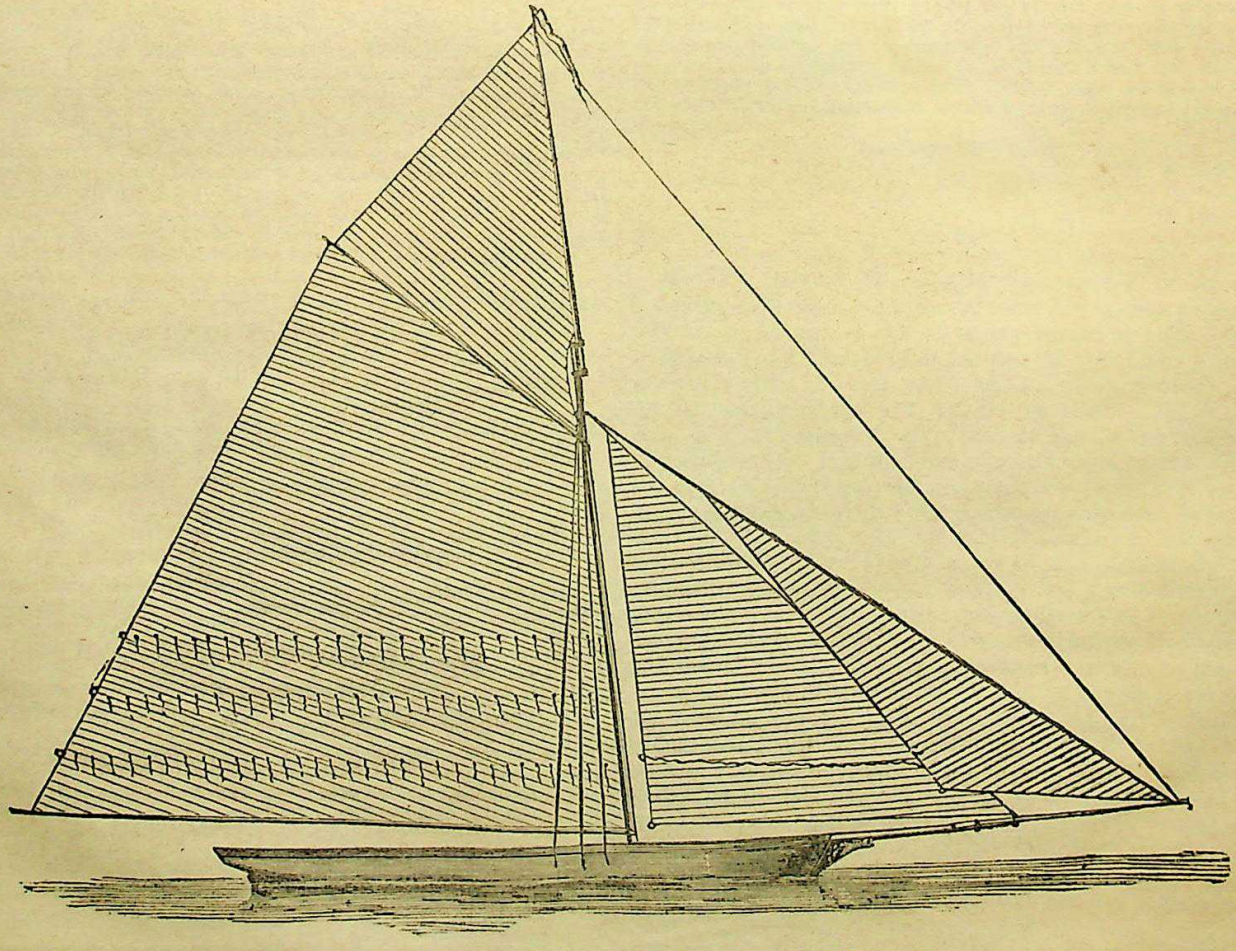
Fig. 2.



SHIP JAMES MAULL.

PILOT BOAT W. WILDIN.

Fig. 3.



YATCH MARIA,—*John C. Stephens, Esq. N. Y.*

As a further evidence in favor of the adoption of Mr. Maull's Sails, besides the few following Certificates, which he has received from practical navigators who have them now in use, we are informed that the Sail makers upon the Mediterranean, have also adopted his system.

CERTIFICATES.

Barque John Welsh,
PHILADELPHIA, May, 1846.

MR. MAULL—

I have been uninterruptedly going to sea, man and boy, for forty years; and, from the experience of others, and my own predilections, I was tempted to try your Patent Horizontal Seamed Sails upon my barque more than a year ago. As I have a full suit of them, I have had, in the many voyages I have made in the barque, some chance of judging, not only about square, but also of fore and aft sails. They all work well, have given less trouble, and cost little or nothing during the same period of time, when compared with the old manner of up and down seams.

Your friend,
JOSIAH AMES.

PHILADELPHIA, March 16th, 1846.

JAS. MAULL—

We have been appointed a committee on the part of our associate pilots of the Pilot Boat, Wm. Whilden, sailing out from Cape May, to tell you what has been the result of our use of the suit of fore and aft sails, which you made for us on your new plan.

It is plainly this:

The Wm. Whilden (PLATE II, *fig.* 2.) now goes, with her new sails with a single stretch, in parts of channels at the Capes of the Delaware, where, with sails on the old plan, she was obliged to tack. This is truly owing to the fact that she comes up higher to the wind by fully half a point. She fore reaches better, and looses less way in tacking.

We consider that as the seams of the sail cloths run flatwise, the lapping of the cloths on each seam make a kind of foot rope every time one of them is brought down to the boom to be reefed by the tackles. We consider that the cross band keeps the sails from any chance of splitting, and gives a good hold to prevent the sails from being stretched, even if the leech rope should give way. There is no doubt in our minds, but what the William Whilden is not only a faster, but a much safer pilot boat with her new sails, than she ever was before, as we know that she claws off the land better than she ever did. We give this as the honest opinion of all our associates in the boat, and we can fairly add that without exception, we have heard them most favorably spoken of by not only those who have used them, but also by the pilots of other boats cruising out of the Capes, who tell us that when renewing the sails which they at present have, will give the horizontal principle of sail making a fair show. We have only to add that we all hope to live long enough, not only to wear out the sails which you made for us, but to see the plan adopted by every vessel which we have occasion to pilot.

If this opinion of ours is of any use to you, you may refer to it at any time.

PHILIP HAND,
I. A. STEVENS,
R. HAND,
GEO. CROMMELL,
} Committee.

Note.—Any of the pilots attached to the boat, will at any time prove to others this opinion which we here give.

PHILADELPHIA, February 10th, 1846.

MR. MAULL—

Sir.—In compliance with your request, I have a pleasurable duty to perform in speaking of what I know, relative to the sails made by you for the Brig "Wm. J. Watson," some two years ago. I believe that I was among the first, if not the very first, that made use of sails cut and made on the plan which you have patented. Those sails are still in use on the brig, and I unhesitatingly assert that for durability, (for that after all is the great point,) under similar circumstances of exposure to wear and tear, they have far exceeded any others that in the course of my seafaring life I have occasion to use. I have used them in very heavy weather, and under circumstances in my opinion, well calculated to test their value. I consider that cutting the sails so that the seams of the cloth run horizontally, makes them less liable to burst in heavy gusts when it is not possible to reef them quickly.

In reefing I have found th em to be more easily handled, and what is of moment, more safely secured in a less period of time than by any other plan. The seams of my sails are folded, and put in the least possible space, that the thickness of the materials of which they are made admits. In this particular, the plan of my sails is in my opinion, most peculiarly applicable to those cloths which are sometimes imported from Russia. As for the cotton canvass, I cannot after two years faithful use, find that there is any difference in the wear of either of the threads whether up or down. One thing however is certain, that until some better plan than that upon which my present sails are made is invented, I shall use no other.

They last longer, they reef easier, and set fully one half point nearer to the wind, than those made on the vertical plan.

With wishes for its successful introduction, I am yours, respectfully,
ECKFELDT,
Master Brig Wm. J. Watson.

BRIG ADELE, March 2.

MR. MAULL—

During the voyages which I commanded the brig, I have had sails made on your plan. With them I have seen some very heavy weather in rounding the Cape and up the stream, while in the St. Jago trade, and I can truly say, that not only I have no fault to find with them, but that I would not change my sails, even though in use for days, could I not procure another suit similar to them, for a new suit made on the old plan. They are not pelted as others made at the same time. They have cost little or nothing for repairs. No new cloth has been put on them, and there is no appearance of any strain upon any seam, or part of seam. Moreover, they lay flat and are quickly handled in suddenly bad weather.

CAPT. STEELE.

In the wear, set, and good quality of Mr. Maull's sails, I have so far expressed a favorable opinion, as to have recommended their use to others.

R. F. LOPER,
South Wharves

PHILADELPHIA, April 15th, 1846.

JAMES MAULL, Esq.

Dear Sir.—You will perhaps remember, that it was with reluctance I consented to adopt your patent method; but now that I have given them a fair trial, I unhesitatingly assert that I would not have sails made on the old plan as a gift, if yours were to be had. If any doubt now the superiority of your sails, I only beg of such persons to give them a trial, and they will find that for propelling vessels on the wind, ease in reefing and furling, and for durability and strength, they are infinitely superior to the old fashion sails. In conclusion I will add, that vessels that formerly beat the Caroline with vertical sails, we now beat easily. My crew is anxious also to bear testimony to the superiority of your sails, if you wish it.

I am very truly yours,
CAPT. DODD,
SILAS DODD,
of Christiana.

MAULL'S PATENT SAILS.—By the arrival of the steamship Cambria, at Boston, we received some newspapers published at Trieste in Austria, in one of which we found quite a lengthy description of a Philadelphia barque, the "William Kennedy," most of which, however, was taken up with a nautical critique on the merits of the plan of our townsman, James Maull, Esq, for the cutting of sails, both of square rigged and fore-and-aft vessels. It is a source of gratification to us to find that the opinion which we ventured some two years since, as to the intrinsic value of this invention, has not only won its way into favor here, at home, but that abroad it bids fair to find equal encouragement. The Trieste paper alludes particularly to the originality of the plan;—this praise, coming as it does from the press of a free seaport town, where vessels of every kind do congregate, affords ample evidence that, on the Mediterranean, nothing of the kind has been previously seen. As the seams cross the width of the sail, and being, of course, more numerous than on the old plan, they act as bands, stiffening and strengthening the sail, thereby flattening it to that degree, causing vessels to lie fully a point nearer to the wind, and enabling her to sail faster when close hauled, as the usual bellying of the sails is thus avoided. In reefing or furling sails of cotton, or other stiff, heavy, narrow duck, the horizontal seams fold smooth and easy on the yard, without breaking; whereas, on the old plan of vertical seams, each one has to be folded the

whole width of the sail several times, and require more strength and exertion.

In hauling out the reef tackles and ear-rings by this new method of running the cloths horizontally the strain is taken upon the warp or stronger portions of the sail cloth, and of course are less subject to be torn or split. The above are the essential features of the plan of Mr. Maull, and they have, to the minutest point of benefit claimed for them, proved worthy of the commendation bestowed. Our oldest and most experienced ship masters and pilots use and approve of the plan. Our merchants have generally bore testimony to the lasting quality of the sails made in this manner, and our yatching squadron have seen the vessels of Messrs. Stevens and Cadwallader laying a little closer to the wind with these sails than they would otherwise have done. The Swedish Consul at this port tells us that in his country these sails have also excited attention by their originality, and the ease with which they are handled. We mention these evidences of success had by our townsmen, with pleasure, as corroborative of the opinion entertained of the merit of his plan.—*U. S. Gazette.*

THE YATCH MARIA.

(Plate II, *fig.* 3.)

This celebrated Yatch, the property of John C. Stevens, Esq., of New York, of 130 tons burden, is slooped rigged, with the patent horizontal sails, made by Mr. Maull, as we have before observed; and said to be the largest sails ever hoisted in the United States, and perhaps in the world.

The following dimensions of her sails, have been politely furnished us by Mr. Maull.

Hoist of Mainsail	finished		71 feet
Head of	do	do	48 "
Foot of	do	do	90 " 3 inches
Angle of	do	do	111 "

Counting 2133½ yards extra No. Cotton Canvass 13 inch. wide.

Stay of Jib	finished		94 feet, 3 inches
Leech of	do	do	72 "
Foot of	do	do	56 " 3 inches

Counting 964 yards, 13 inches heavy No. Cotton Canvass Jib.

Mast of Gaff Topsail	finished		71 feet
Leech of	do	do	61 "
Foot of	do	do	43 "

Counting 576 yards.
Flying Jib 300 do.
Total number of yards 3974½

Letters Patent were also granted to *Warren C. Choate*, of Washington, D. C., April 17, 1846, for a new mode of cutting Sails; an account of which will be found on page 8, of the first number of the Mirror.

Ship Blocks.—The mode of strapping blocks, by carrying the iron strap outside of the block, is deemed to be objectionable, from the circumstance that the pin of the sheave is supported by the strap at too great a distance from the sheave, the thickness of the shell intervening. To remedy this evil, an improvement has been patented, which consists in attaching the iron strap to the inside of the cheeks; thus bringing the straps directly against the sheave.

A Truss has long since been used to sustain the yards of vessels, but when applied to any of the lower masts, it becomes necessary to unship the yard before the mast immediately above it can be lowered. To remedy this inconvenience, a Truss has been invented and patented within the year, so constructed that the upper mast can be lowered directly through the truss, without disturbing either truss or yard.

The injurious effects of the *Booms* and *Gafts* of mainsails, foresails &c., upon masts, have induced ship builders to resort to various expedients for avoiding them. Friction rollers, slides, &c., have been placed in the jaws of the boom or gaft. Slides have been used with some success; but when applied to the boom jaws, the slides, by resting upon and striking against the saddle, soon become bruised and broken in such a manner as to injure rather than protect the mast. Letters patent have been recently granted for a means of avoiding this difficulty, which consists in so constructing and supporting the saddle, that a space is left between it and the mast for the reception of the slides, while the boom rests upon the saddle in the usual way.

Spring Cable.—Letters patent have been granted, within the year, for a Cable Spring, to be used when ships are riding at anchor. Its object is to prevent the violent and injurious jerks and strains which are caused by the motion of the vessel. The machine consists of a long wedge, placed between two rollers in a frame firmly fixed. The rollers are pressed together by powerful springs, for the purpose of resisting the passage of the wedge between them. The cable is then attached to the wedge, sufficient slack being left between the wedge and the capstan, and when any strain comes upon the cable the wedge is drawn in between the rollers as the springs yield, and is forced back by them when the strain is removed. By this device allowance can be made, by a comparatively small contraction of the springs, for a very considerable motion of the vessel.

Ice Breakers.—For the purpose of keeping harbors clear of ice, various modes have been suggested of adapting saws and hammers to the bow of a boat propelled by steam, by means of which the ice was to be cut into strips, and then broken into small blocks, and these blocks pushed to each side of the boat by guards placed at the bow, and back of the breakers. A patent has been granted for so modifying the form and arrangement of these guards as to depress the blocks of ice below the surface, and push them under the surrounding ice, and thus leave the channel clear, by a combination of inclined planes.

Life Preservers.—The danger of leakage in that class of Life preservers which consist of inflated bags, by forcing air into them, led to the substitution of a helical spring, made of metal or other substance, or rings placed within a bag, the heads of which are to be provided with valves, to admit air in drawing it out, and with hooks, to secure the belt around the body. And it is desirable to make these in the form of an ellipses, in their transverse section, a single spring or set of rings, it is supposed by some, might be collapsed by a pressure of the water; and, to avoid this difficulty, it has been improved by composing it of two wire helices attached together, side by side.

PROPELLING BOATS AND VESSELS, &c.

Several patents were granted in 1844, for modifications of screw or spiral propellers, and modes of applying them to vessels. In one of these, the paddles are simply placed at an angle of about 45° with the line of the shaft, instead of being curved or twisted; and they are so connected with the shaft as to extend the surface or face of the paddle, at the middle of its width, to the centre of the shaft, or nearly so; the hub being formed between the middle and the edges—the inclining of the planes of the paddle with the axis of the shaft admitting of this form; for a straight line at the base of the paddle intersects the shaft at the middle of the paddle's width, at a point much nearer the centre than it does at the edges of the paddle. In this way, the necessary strength is given, and the face of the paddle extended nearer to the centre of the shaft than by any other known mode.

Another consists in giving to the plane of the spiral or twisted paddle an inclination from a radial line projected from the centre of the shaft.

Ingenuity seems to be on the utmost stretch to devise some mode of propelling vessels by means of apparatus placed below the water line, and therefore beyond the reach of the action of waves and shot; and as many entertain the opinion that the class of propellers above referred to are wasteful of power, various methods have been resorted to with a view of obtaining better results by other means. Several have lately been patented, the characters of which are as follows: One of them consists of two rotating plates arranged at the bottom of the vessel, one forward of the other, in the line usually occupied by the keel, and provided with hinged flaps or paddles, kept close, or folded up even with the surface of the rotating plates, to which they are hinged, by the resistance of the water during a portion of their circuit, and thrown out by a cam or inclined plane during that portion of their circuit in which they are required to act on the water to propel the vessel. The cams that throw out the paddles are so arranged that their positions can be shifted at pleasure, and throw them out in any part of their circuit relatively to the line of the keel; and thus propel forward, backward, sideways, quartering—in short, in any desired direction.

Another is composed of a wheel with vanes, like a rotary fan-blower, working horizontally in a case within the vessel, so arranged as to admit water to the centre of the wheel; which, by centrifugal action, is discharged at the periphery through tangental pipes extending in different directions to the stern, bow, and sides of the vessel, and provided with gates or valves, so as to discharge the water from any of them at pleasure, and thus propel the vessel in the direction desired. The idea of propelling vessels by means of currents of water admitted to the centre of the wheel, and discharged in tangents at the periphery, is old—a patent having been granted for it before; but the addition of tangent pipes, for the discharge of the water in different directions, constitutes the essential feature of novelty under the present patent.

A modification of the duck-foot paddle has also been patented; the main object of which is to adapt it to the shifting of the paddle, with the view of propelling backward; together with an arrangement to insure the proper presentation of the paddles in the propelling and returning action.

The common paddle wheel has long since been arranged with the paddles forming an angle with the line of the shaft—the two halves inclining in opposite directions, and forming an angle in the middle; and a patent has lately been granted for modifying this arrangement, by overlapping the two halves of the paddle in the middle, and placing one forward of the other, so as to leave a space between them for the discharge of water.

The great rivalship between railroads and canals, and the necessity of reducing the cost of transportation on the latter, have led to numerous experiments in various parts of the country to apply steam as a mode of propulsion. The side wheels are known to be objectionable for many reasons, but particularly on account of increasing the width of the boat. It was long since proposed to remove this difficulty, by placing the paddle wheels at the bow or at the stern; both of which were soon abandoned. Of the numerous plans lately devised for this purpose, but one was patented during the past year, which consists in placing the paddle wheels on each side of the bow, with the plane of the paddles at right angles with the general plane of the bow; and effecting this by either making the paddles parallel with the shaft, and placing the plane of the wheel parallel with the general plane of the bow, or by placing the shaft at right angles with the keel, and the paddles at an inclination with the shaft —*Ellsworth's Report, page* 487.

Applications for letters patent for improvements in propellers were very numerous during the year 1845, but most of the alleged inventions presented were old, and of course rejected; and, with few exceptions, those which have been patented possess very little novelty or usefulness. The applications have extended to almost every class of propellers, but principally to that variety known as the "*screw*" propeller. As they present no striking features to distinguish them from others which are well known, it is unnecessary to go into a detailed description of them.

The spiral propeller, although among the best submerged propellers now in use, is subject to a very serious objection; an objection which cannot be removed, as the defect is incident to, and inseparable from, the very nature of the propeller. And it is this: when the propeller revolves, only a portion of the force, which it derives from the engine, is exerted to propel the vessel, the remainder being lost in lateral pressures, which produce no beneficial effect; and, indeed, it is well if they do no harm. It will be readily perceived that, if the floats were at all points parallel to the shaft, the whole force would be exhausted in lateral pressures, and no part of it would be exerted to propel. If, then, the floats are placed in a position slightly angular to the line of the shaft, a slight propulsive force would be produced, but a diminished lateral force would still be exerted; and, as the angle of the float increases, the relative proportions of these forces will vary until the floats become perpendicular to the line of the shaft, when no power, propulsive or lateral, is exerted. It is only in positions between these extremes, and partaking more or less of both, that propulsive power is attainable, and in such positions the lateral force is also exerted and lost. By the well known mode of resolving forces, the force exerted by each float may be decomposed into two—one in the direction of the shaft, and the other perpendicular to it; the former, alone, would exert a beneficial influence, and the latter would be lost. If the angle of the float is such as to produce very little lateral pressure, an impracticable velocity of the propellor would be required to produce a reasonable degree of speed in the vessel, so that no position of the floats will answer a practical purpose which does not waste a great part of the power in lateral pressures. However the floats may be formed, this objection will still, in one way or another, cling to them. And, as economy of power is of the utmost importance, particularly in sea going vessels, where the submerged propeller is especially necessary, it is highly important that a propeller should be introdueed whose action is direct, aud which is not incumbered with those practical inconveniences which have impaired the usefulness of most of those which have hitherto been essayed.—*Burke's Report, page* 66.

KEELS.

One invention, relating to the moveable keels of vessels, was the subject of a patent in 1845. The bulk-head, in an important part of the hold, which is necessary for the reception of the slip or sliding keel, causes much inconvenience in lading, and considerably diminishes the capacity of the vessel. To obviate these inconveniences, the patentee places the moveable

keel in the proper position upon the outside of the vessel, where it is retained by bolts passing down into it, through the pillars which support the middle of the thwarts, and through the bottom. Chains also pass in like manner, to the top of the keel, to draw it up and hold it tight against the bottom of the vessel, and which have sufficient length to allow the keel to be drawn up the side of the vessel and out of the water. Other chains are attached to the keel, which pass up the side of the vessel, for drawing it up out of the water, when, by the withdrawal of bolts and loosening of the other chains, the keel is unshipped. I make no remark upon the probable usefulness of this invention, but shall leave it to practicable men.—*Ib. page* 65.

IRON BOATS.

One patent has been granted for an improvement in the construction of Iron boats, which is worthy of attention, and which will be understood from the following extract taken from the patent:

"My invention consists in forming the sheets of metal with mouldings or beads, in suitable places to take up the surplus metal, when said plates are pressed into form, by means of projections on the die and corresponding depressions on the matrix or concave mould, which gather up the metal and prevent wrinkles around between the upper and lower parts of the boat, so as to present a smooth surface, and also in forming a recess or bed for the gunwale, which holds it in place, and prevents its getting knocked down. I also add a flanche around the stem and stern posts, and along the line of the keel which takes up the surplus metal there, and forms the keel and stem and stern posts."—*Ib.*

HARPOONS.

Various devices have been resorted to, to improve the harpoon used by whalers; and amongst others, it was proposed, some years ago, to enclose within the harpoon a vessel containing prussic aid, which, on striking would be diffused, and thus kill the whale. As an improvement on this, a patent has been granted for putting a bottle of explosive mixture within the fluke of the harpoon, which is jointed to the stem or handle, so that the pull of the whale will open the fluke and explode the mixture.—*Ellsworth's Report*, 489.

THE ELECTRO-MAGNETIC TELEGRAPH.

Through the politeness of the Commissioner, we are enabled to lay before our readers the following statements and correspondence of Mr. Morse upon the Electro-Magnetic Telegraph system of communication, both in our own Country and Europe, together with the illustrations of the various systems. The daily practical results of this system of communication are too well known to require comment.

The magneto-electric machine was originally contrived by Mr. Saxton, soon after the commencement of the interesting discovery of Faraday, that magnetism was capable of exciting electricity. The conditions necessary for obtaining electricity in this way were, chiefly, the disturbance of magnetic forces in a bar of soft iron surrounded by coils of wire. A number of mechanical contrivances were resorted to, in order to effect this disturbance, by causing the bar of iron, thus surrounded, to approach to and recede from the poles of powerful magnets; but the ingenuity of Mr. Saxton far exceeded them all, by giving to the coils and enclosed bar a rotary movement about the poles of a U-form magnet. This instrument afforded bright sparks and strong shocks; but the currents of electricity thus obtained could not be converted to any useful purpose, as, in each half revolution of the coils, the currents were in opposite directions. In 1838 Professor Page published in Silliman's Journal an account of an improved form of the machine, doing away with many existing objections, and furthermore rendering it at once a useful instrument, by a contrivance for conducting these opposing currents into one channel or direction, which part of the contrivance was called the unitress. The current produced in this way was capable of performing the work, to a certain extent, of the power developed by the galvanic battery; and the machine was found adequate to the furnishing of shocks for medical purposes, for exhibiting the decomposition of water, furnishing the elements oxygen and hydrogen at their respective poles, and producing definite electro-chemical results. These two last results could not be obtained without the aid of the unitress. But, with this improvement, the instrument was still wanting in one property of the galvanic battery, viz: that property which chemists call quantity, or that power upon which depends its ability to magnetize, and also, to heat platinum wires. This last property has been given to the machine by the recent contrivance of Professor Page. The machine, in its novel construction under his improvement, developed what is called, by way of distinction, the current of intensity, but had a very feeble magnetizing power. By a peculiar contrivance of the coils, (not to be made public until his rights are in some way secured,) the current of quantity is obtained in its maximum, while, at the same time, the intensity is so much diminished that it gives scarcely any shock, and decomposes feebly. It has been successfully tried with the magnetic telegraph of Professor Morse, and operates equally well with the battery. It affords, by simply turning a crank attached to the machine, a constant current of galvanic electricity; and as there is no consumption of material necessary to obtain this power, it will doubtless supersede the use of the galvanic battery, which, in the event of constant employment, would be very expensive, from the waste of zinc, platinum, acids, mercury, and other materials used in its construction. It particularly recommends itself for magnetizing purposes, as it requires no knowledge of chemistry to insure the result, being merely mechanical in its action, and is always ready for action without previous preparation; the turning of a crank being the only requisite when the machine is in order. It is not liable to get out of order; does not diminish perceptibly in power when in constant use, and actually gains power when standing at rest. It will be particularly gratifying to the man of science, as it enables him to have always at hand a constant power for the investigation of its properties, without any labor of preparation. We notice among the beautiful results of this machine, that it charges an electro-magnet so as to sustain a weight of 1,000 pounds, and it ignites to a white heat large platinum wires, and may be used successfully for blasting at a distance; and should Government ever adopt any such system of defence as to need the galvanic power, it must supersede the battery in that case. Professor Page demonstrates, by mathematical reasoning, that the new contrivance of the coils affords the very maximum of quantity to be obtained by magnetic excitation.

MORSE'S ELECTRO-MAGNETIC TELEGRAPH.

The electro-magnet is the basis upon which this whole invention rests in its present construction; without it, it would entirely fail. The electro-magnet is produced by coiling around a bar of soft iron, made in the form of a horseshoe, (fig. 1,) copper wire previously covered, similar to bonnet wire, and varnished to prevent metallic contact with each other and the iron, (fig. 2.) The two terminations of the wire, thus surrounding the iron in a spiral form, are brought out at each end of the curved bar, and

are connected, one with the zinc pole of a galvanic battery, the other with the platinum; the battery being prepared in the usual manner with its corroding acid, produces galvanic electricity, which starts off from one pole of the

Fig.1

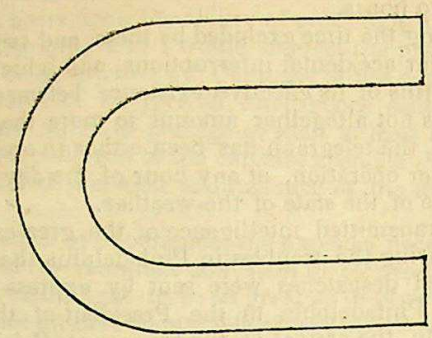
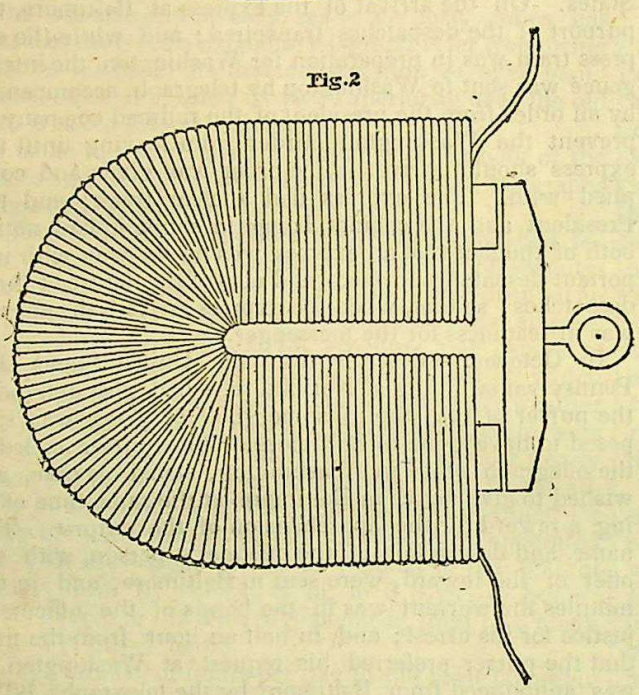
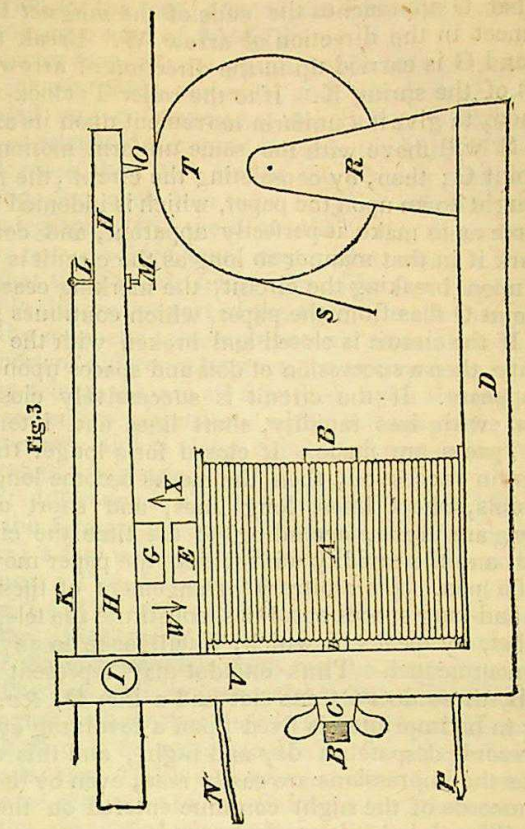


Fig.2



battery, follows the wire around the soft iron, and returns to the other pole of the battery by the other wire—thus forming a complete circuit. The galvanic fluid is now passing the whole length of the wire, and, while thus passing, the curved iron becomes a strong magnet. By connecting the two ends of the bent iron with a bar of similar soft iron, it will support many pounds weight. If, while in this condition, one of the wires is removed from the battery, the cross bar falls, and with it its weights. The curved iron returns instantly to its original state. It is unmagnetized. Complete the circuit, as at first, and in an instant it is again a magnet. Break the circuit and it ceases to be a magnet. If the battery is placed 100, or 1000, or 10,000 feet from the magnet, yet when the one is connected with the other by intervening wires, the effect upon the magnet is the same—making it a magnet when the circuit is complete, and *vice versa* when it is broken. In this way, power is produced at a point of considerable distance from the generating agent, and wholly at the command of the operator at the battery to make or destroy the power produced, with the utmost possible rapidity.

Fig.3



The above figure represents the most simple form of the electro-magnet, with its appropriate machinery for telegraphic purposes. A represents a side view of the bent iron bar, surrounded with its coils of copper wire, standing upon a platform D. V being an upright arm secured to D, to which the magnet or soft iron, is permanently fastened by means of the bolt B B B passing between the prongs of the curved iron, and through board V, and adjusting screw C. E is the projecting prong of the iron after it has passed through the coils—one only being seen. The other prong is directly behind E. G represents the end of the iron bar, or keeper, extending back so far as to cover both the projecting ends of the horseshoe-formed magnet. This iron bar, or keeper, is fastened to the lever H H, which is delicately adjusted so as to rise and fall by a pivot at I. K represents a steel spring over the lever H H, and passes through a loophole L, formed from a brass wire; the lower part of the brass wire being secured to the lever H H by means of a screw at M. O is a hardened steel point, similar to those used by manifold letter writers, and is also connected with the lever H H, and directly over the centre of the metallic roller T, in which a slight groove is made, to correspond with the point of O. R represents the standard in which the axis of the roller T freely revolves, and is a part of D. The line S represents the paper, in form of a riband, passing from its coil between the roller and the point of O. N and P are the two extremities of the wire upon the magnet A. Every part is now described; and from what has preceded the description, bearing in mind the effect of the battery when in action upon the soft iron, by forming a complete circuit with the wires N and P, the mode of writing by the instrument may be easily comprehended

by what follows. Complete the circuit, and instantly the cross bar G approaches the ends of the *magnet* E, until they meet in the direction of arrow W. Break the circuit, and G is carried up in the direction of arrow X, by means of the spring K. If to the roller T clock-work is attached, to give it a uniform movement upon its axis, the paper S will move with the same uniform motion under the point O; then, by completing the circuit, the point O is brought down upon the paper, which is indented to such a degree as to make it perfectly apparent, and continues to mark it in that manner so long as the circuit is closed; but, upon breaking the circuit, the marking ceases, and the point O flies from the paper, which continues passing on. If the circuit is closed and broken with the utmost rapidity, then a succession of dots and spaces upon the paper appears. If the circuit is successively closed and broken with less rapidity, short lines and intervening short spaces are made. If closed for a longer time and broken in succession, then the marks become longer; so that dots, short lines, long lines, and short or long spaces, are made, according to the time the circuit is closed, and the rapidity with which the paper moves under the pen. An arbitrary arrangement of these dots, short and long spaces and lines, constitute the telegraphic alphabet, by means of which, intelligence to any extent is communicated. Thus one dot may represent A, two dots B, three dots C, one dot and a line D, &c. The paper to be imprinted is fixed upon a revolving cylinder, and records despatches day and night, and this without ink, as the impressions are easily read, even by the blind. The records of the night continue entered on the morning. The alphabet is easily learned.

Extracts from a letter addressed by Professor Morse to the Secretary of the Treasury, relative to the Magnetic Telegraph.

That which seemed to many chimerical at the time, is now completely realized. The most skeptical are convinced; and the daily and hourly operations of the telegraph, in transmitting information of any kind, are so publicly known, and the public feeling in regard to it so universally expressed, that I need here only give a few instances of its action, further to illustrate its character.

The facts in relation to the transmission of the proceedings of the Democratic Convention at Baltimore, in May last, are well known, and are alluded to in my report to to the department, June 3, 1844. (House Doc. No. 270, 28th Congress, 1st session.) Since the adjournment of Congress in June last, and during the summer and autumn, the telegraph has been in constant readiness for operation, and there has been time to test many points in relation to it, which needed experience to settle.

For more, now, than *eight months*, the conductors for the telegraph, carried on elevated posts for forty miles, have remained undisturbed from the wantonness or evil disposition of any one. Not a single instance of the kind has occurred. In several instances, indeed, the communication has been interrupted by accidents, but then only for a very brief period.

One of these was by the great fire in Pratt street, Baltimore, which destroyed one of the posts, and consequently temporarily stopped the communication; but in two or three hours the damage was repaired, and the first notice of the accident, and all the particulars, were transmitted to Washington by the Telegraph itself.

Another instance of interruption was occasioned by the felling of a tree, which accidently fell across the wires, and at the same time across the railroad track—stopping the cars for a short time, and the telegraphic communication for two hours.

Excepting the time excluded by these, and two or three other similar accidental interruptions, and which, during seven months of its effective existence between the two cities, does not altogether amount to more than twenty-four hours, the telegraph has been either in operation, or prepared for operation, at any hour of the day or night, irrespective of the state of the weather.

It has transmitted intelligence of the greatest importance. During the troubles in Philadelphia the last summer, sealed despatches were sent by express from the mayor of Philadelphia to the President of the United States. On the arrival of the express at Baltimore, the purport of the despatches transpired; and while the express train was in preparation for Washington, the intelligence was sent to Washington by telegraph, accompanied by an order from the president of the railroad company to prevent the Washington burden from leaving until the express should arrive. The order was given and complied with. The express had a clear track; and the President and the cabinet, being in council, had notice both of the fact that an express was on its way with important despatches to them, and also of the nature of those despatches; so that, when the express arrived, the answer was in readiness for the messenger.

In October, a deserter from the United States ship Pennsylvania, lying at Norfolk, who had also defrauded the purser of the ship of some $600 or $700, was supposed to have gone to Baltimore. The purser called at the telegraph office in Washington, stated his case, and wished to give notice in Baltimore, at the same time offering a reward for the apprehension of the culprit. The name, and description of the offender's person, with the offer of the reward, were sent to Baltimore, and in ten minutes the warrent was in the hands of the officers of justice for his arrest; and, in half an hour from the time that the purser preferred his request at Washington, it was announced from Baltimore by the telegraph, "The deserter is arrested; he is in jail. What shall be done with him?"

To show the variety of the operations of the telegraph, a game of drafts and several games of chess have been played between the cities of Baltimore and Washington, with the same ease as if the players were seated at the same table. To illustrate the independence of the telegraph of the weather and time of day, I would state that, during the severe storm of the 5th of December, when the night was intensely dark, the rain descending in torrents, and the wind blowing a gale, it seemed more than ordinarily mysterious to see a company around a table in a warm retired chamber on such a night in Washington, playing a game of chess with another company similarly situated in Baltimore—the darkness, the rain, and the wind, being no impediments to instantaneous communication.

In regard to the quantity of intelligence which may be sent in a given time, it is perfectly safe to say thirty characters can be transmitted in a minute by a single instrument; and, as these characters are conventional signs,

they may mean either *numbers, words, letters* or *sentences*.

As an illustration of this point, I will state that nearly a whole column (more than seven-eighths) in the Baltimore Patriot, was transmitted in thirty minutes—faster than the reporter in Baltimore could transcribe.

This fact bears upon the ability of producing a revenue from the telegraph; and I would suggest the propriety of permission being granted by Congress to the department to adjust a tariff of charges on intelligence sent by telegraph, at such a rate of postage as shall at least return to the treasury the interest of the capital expended in the first construction and the after maintenance of the telegraph.

* * * * * * *

In the absence of experience, the expense necessary to construct and to maintain a system of electro-magnetic telegraphs was thought to be so great as to present a formidable, if not an insurmountable obstacle to its adoption. But the experiment already made for forty miles has shown that the electro-magnetic telegraph is far from being expensive either in its first construction or after maintenance, especially when its vast superiority over the old system is taken into consideration.

To make this more clear, I give an abstract both of the expenses and capacities of the ordinary visual telegraphs in some of the European countries.

In England, the semiphore telegraph established between London and Portsmouth, (a distance of seventy-two miles,) is maintained by the British Government at an average expense of £3,405, or $15,118 per annum. From a return (vol. 30, 1843, accounts and papers of House of Commons) of the number of days during which the telegraph was *not available* on account of the weather during a period of three years, it appears that there were in that time 323 days in which it was useless, or nearly *one year out* of *three!* But by a return made to the admirality of the number of hours in the day appointed for working the telegraph, it appears that the hours appointed for the year are—from the 1st of October to the 28th of February, from 10 o'clock, a. m., to 3 p. m.—5 hours; the 1st of March to the 30th of September, from 10 o'clock a. m., to 5 p. m.—7 hours.

Average number of hours per day in the most favorable weather, 6 hours!

Deducting one year from the three for unavailable days, the average time per day for the three years would be but 4 hours. So that for the use of their telegraph for seventy-two miles, and for only 4 hours in the day, the British Government expend $15,118 per annum.

The French system of telegraphs is more extensive and perfect than that of any other nation. It consists at present of five great lines extending from the capital to the extreme cities of the kingdom, to wit:

The Calais line, from Paris to Calais	152	miles.
The Strasbourg line, from Paris to Strasbourg	255	"
The Brest line from Paris to Brest	325	"
The Toulon line, from Paris to Toulon	317	"
The Bayonne line, from Paris to Bayonne	425	"

—making a total of 1,474 miles of telegraphic intercourse. These telegraphs are maintained by the French Government at an annual expense of over 1,900,000 of francs, or $202,000.

The whole extent, then, of the French lines of telegraph, is 1,474 miles, with 519 stations; and (if the estimate for six stations, at an average cost of 4,400 francs, is a criterion for the rest,) erected at a cost of at least $880 each—making a total of $456,720.

The electro magnetic telegraph, at the rate proposed in the bill, (to wit, $461 per mile, and which it should be remembered will construct not *one* line only, but *six*,) could be constructed the same distance for $619,514—not one third more than the cost of the French telegraphs. Even supposing each line to be only as efficient as the French telegraphs, still there would be six times the facilities for not one-third more cost. But when it is considered that the French telegraphs, like the English, is unavailable the greater part of the time, the advantages in favor of the magnetic telegraph become more obvious.

An important difference between the two systems is, that the foreign telegraphs are all a burden upon the treasury of their respective countries; while the magnetic telegraph proposes, and is alone capable of sustaining itself and producing a revenue.

Another difference in the two systems is, that the stations in the foreign telegraphs must be within sight of each other; a fact which bears essentially on the cost of maintenance. The French telegraph requires, for the distance of 1,474 miles, no less than 519 stations—averaging *one for about every three miles*. The number of stations of the magnetic telegraph, on the contrary, is optional. The two stations (one only at Baltimore and one at Washington,) show that they may be at least 40 miles apart; and there is no reason to doubt, from experiments I have made, that 100 miles, or even 500 miles, would give the same results. In the maintenance, therefore, of stations, the magnetic telegraph would require but 15 stations, (assuming that 100 miles is the *utmost limit* of transmission between the two stations, which is not probable;) while the French requires 519 for the same distance.

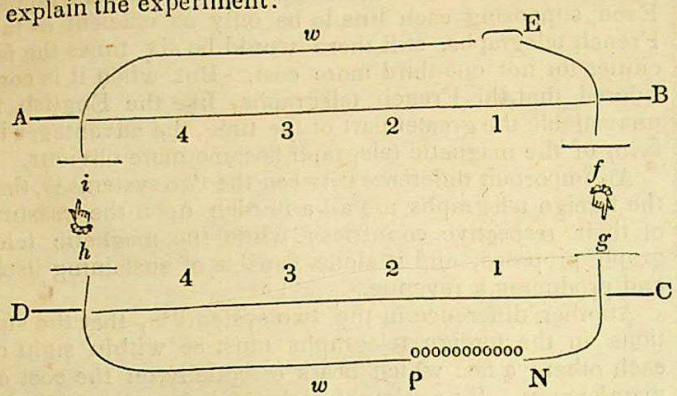
When to this are added the facts, that the magnetic telegraph is at *all times available*, at *every hour of the day or night, irrespective of weather;* that, in comparison with the visual telegraphs, it communicates *more than a hundred fold* the quantity of intelligence in the same time; that it is originally constructed at a *less cost, (all things considered;)* that it is *maintained for less;* and that it is capable, by a rate of charges for transmitting intelligence, not only of defraying all its expenses, but, if desired, of producing a revenue—I may be permitted to hope that, when these great advantages are fully understood, my system will receive that attention from the Government which its intrinsic public importance demands.

* * * * * * *

In the autumn of 1842, at the request of the American Institute, I undertook to give to the public in New York, a demonstation of the practicability of my telegraph, by connecting Governor's island with Castle Garden—a distance of a mile; and for this purpose, I laid my wires properly insulated beneath the water. I had scarcely begun to operate, and had received but two or three characters, when my intentions were frustrated by the accidental destruction of a part of my conductors by a vessel, which drew them up on her anchor and cut them off. In the moments of mortification, in a sleepless night, I devised a plan for avoiding such an accident in future, by so arranging my wires along the banks of the river as to cause the water itself to conduct the electricity across.

The experiment, however, was deferred till I arrived at Washington; and on December 16th, 1842, I tested my

arrangement across the canal, and with success. The simple fact was ascertained, that electricity could be made to cross a river without other conductors than the water itself; but it was not until the last autumn that I had the leisure to make a series of experiments to ascertain the law of its passage. The following diagram will serve to explain the experiment:



A, B, C, D, are the banks of the river; N, P, are the battery; E is the electro-magnet; *w*, *w*, are the wires along the banks, connecting with copper plates, *f*, *g*, *h*, *i*, which are placed in the water. When this arrangement is complete, the electricity generated by the battery passes from the positive pole P, to the plate *h*, across the river, through the water, to plate *i*, and thence, around the coil of the magnet E, to plate *f*; across the river again to plate *g*, and thence to the other pole of the battery, N. The numbers 1, 2, 3, 4, indicate the distance along the bank measured by the number of times of the distance across the river.

The distance across the canal is 80 feet; on August 24th, the following were the results of the experiment:

No. of the experiment.	No. of cups in battery.	Length of conductors, *w*, *w*.	Degress of motion of galvanometer.	Size of the copper plates, *f*, *g*, *h*, *i*.
1	14	400	32 & 24	5 by 2½ ft.
2	14	400	13½ & 4½	16 by 13 in.
3	14	400	1 & 1	6 by 5 in.
4	7	400	24 & 13	5 by 2½ ft.
5	7	300	29 & 21	5 by 2½ ft.
6	7	200	21½ & 15	5 by 2½ ft.

Showing that electricity crosses the river, and *in quantity in proportion to the size of the plates in the water.* The *distance of the plates on the same side* of the river *from each other* also effects the result. Having ascertained the general fact, I was desirous of discovering the best practical distance at which to place my copper plates; and, not having the leisure myself, I requested my friend Professor Gale, to make the experiments for me.

* * * * * * *

As the result of these experiments, it would seem that there may be situations in which the arrangements I have made for passing electricity across the rivers may be useful, although experience alone can determine whether lofty spars, on which the wires may be suspended, erected in the rivers, may not be deemed the most practical. The experiments made were but for a short distance; in which, however, the principle was fully proved to be correct.

It has been applied, under the direction of my able assistants, Messrs. Vail and Rogers, across the Susquehannah river, at Havre-de Gaace, with complete success—a distance of nearly a mile.

I have as yet said nothing on the telegraph as a mighty aid to national defence. Its importance in this respect is so obvious, that I need not dilate. The importance generally, to the Government and to the country, of a *perfect* telegraphic system, can scarcely be estimated by the short distance already established between Baltimore and Washington; but when all that transpires of public interest at New Orleans, at St. Louis, at Pittsburg, at Cincinnati, at Buffalo, at Utica, at Albany, at Portland, at Portsmouth, at Boston, at New York, at Philadelphia, at Baltimore, at Washington, at Norfolk, at Richmond, at Charleston, at Savannah, and at all desired intermediate points, shall be *simultaneously* known in each and all these places together—when all the agents of the Government in every part of the country are in instantaneous communication with head quarters—when the several departments can at once learn the actual existing condition of their remotest agencies, and transmit at the moment their necessary orders to meet any exigency—then will some estimate be formed both of the powers and advantages of the magnetic telegraph.

Letter from Professor Morse, to the Hon. Edmund Burke, upon the magnetic telegraphs in operation in Europe.

NEW YORK, *February* 2, 1846.

DEAR SIR: In compliance with your request, that I would give you some facts in relation to my electro-magnetic telegraph illustrative of the difference between my system and other systems more recently established in Europe, I would say that, with a view of personally examining electric telegraphs in England and France, I made a rapid tour in those countries in the autumn of the last year. The electric telegraph most in use at present in Great Britain is that invented by Messrs. Cook and Wheatstone, the former of whom, it appears, had his attention first drawn to the subject at Vienna, in 1836, and Professor Wheatstone dates his own invention from the year 1837.

The electric telegraph upon the Paris and Rouen railroad is the joint production, I believe, of M. Foy and M. Brequet, and conceived and executed within the last two years.

To illustrate more perfectly the difference between my system of magnetic telegraphs and the two just mentioned, I will briefly describe the two European inventions.

For the abbreviated description and plates of Wheatstone's rotating disc telegraph, invented by him ir 1841, as an improvement on his former plans, I am indebted to my ingenious friend and assistant, Alfred Vail, esq.*

Professor Wheatstone invented his first telegraph in 1837. It was an improvement of Baron Shilling's *needle telegraph*, invented in 1833. The *deflection* of the *magnetic needle* is the basis of both. The *attractive power of the electro-magnet*, which is the basis of my printing telegraph invented in 1832, was used by Wheatstone in 1837, simply to release the detent of a common alarum to

*They who are desirous of obtaining an account of most of the telegraphic plans, on the electric principle hitherto devised, will find Mr. Vail's larger work, entitled "*The American Electro-Magnetic Telegraph*," a valuable addition to their library.

give notice to the attendant that a communication was about to be made. This magnet was made to act by a special circuit, by means of which a magnetic needle was deflected and closed a circuit with a local battery which charged the magnet. This is the only purpose for which the power of the electric magnet was used in the telegraph by Professor Wheatstone, until the year 1841. There is no instance of any attempt to record or print characters by means of magnetism previous to my invention.

Wheatstone's Rotating Disc Telegraph, invented in 1841.

Fig. 1.

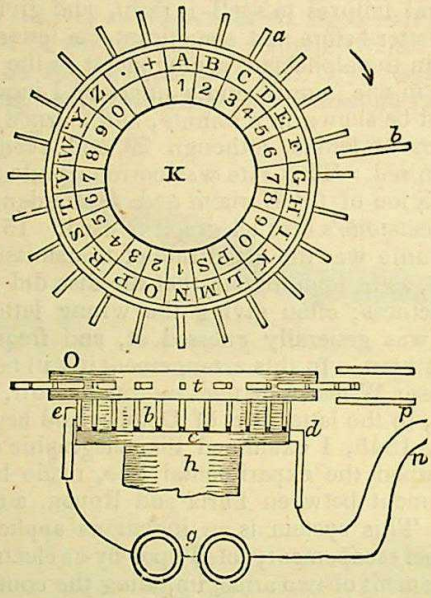


Fig. 1 represents that portion of the instrument which belongs to the *transmitting* station, of which K is a circular disc, with the alphabet and numerals marked in two concentric circles upon it; *a* are handles projecting from its rim, one to every letter, by means of which the disc is turned upon its axis, and brought to that position, *b*, required for signalizing a letter. O is a side view of the disc, K; *t* is the rim of the disc, with its holders; *h* is a portion of the axis of the disc, shown as broken off; *c* represents a silver band surrounding a pulley or hub upon the axis, and directly behind the disc. Upon the hub are metallic ribs *b*, parallel with its axis, corresponding in number to the letters on the dial. Each rib forms a metallic contact with the silver band *c*, and are separated from each other by pieces of ivory fastened to the hub. Both the ribs and ivory pieces are made perfectly smooth and even upon their surface; *e* is a metallic spring, with a portion of it pressed against that portion of the hub between the silver band *c*, and the disc *t*, in a manner that when the disc is turned the metallic ribs and ivory pieces shall alternately come in contact with it. To this spring is soldered a wire connected with one pole of the battery *g*, and from the other pole proceeds the wire *n*: *d* is another metallic spring, similar to *e*, but pressing *only* upon the silver band, with which it is always in contact, and to which a wire, *p*, is soldered. Whenever the spring *e* is in contact with any of the metallic ribs, there is a continuous connexion from *n* to *p*, viz: from *p*, to the spring in contact with the silver band *c*, thence to the rib with which the spring *e* is in contact; then to the spring *e*; then to the battery *g*, and then to the wire *n*. If, however, the disc O should be turned, so that the spring *e* is in contact with the ivory, then the circuit is broken at that point; and in this manner the circuit is alternately broken and closed as the wheel O is turned from one letter to another, by means ef the handles at *t*.

Fig. 2.

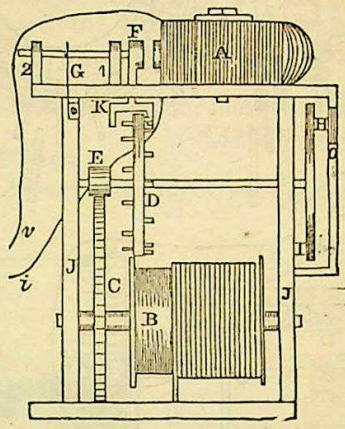
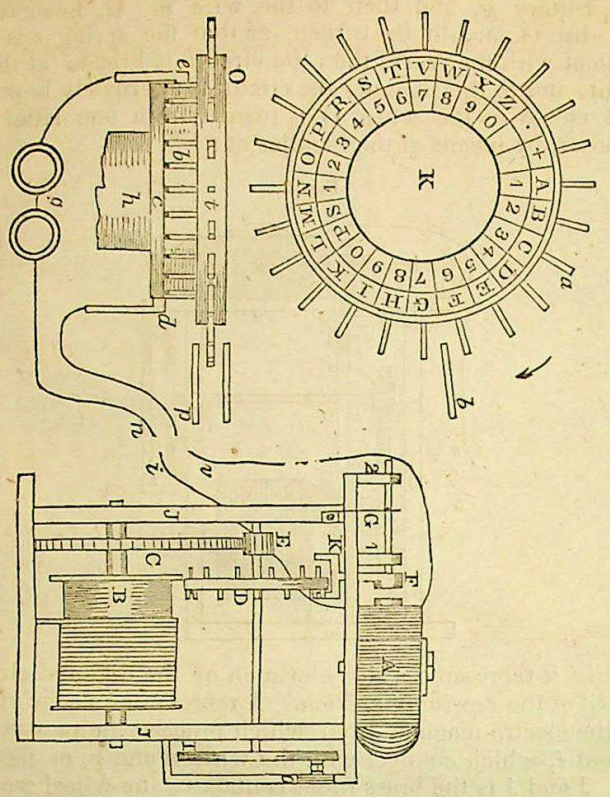


Fig. 2 represents a side elevation of the dial and clock work of the *receiving station.* A represents an edge view of the electro-magnet, from which proceed the two wires *v* and *i*, which connect with the wires *n* and *p*, of figure 1. J and J is the brass frame containing the wheel work, C and E, the pin-wheel D, the dial plate I, and the barrel B, which is driven by a weight and cord. In the side of the wheel D are pins projecting from the rim, parallel with the axis, and are equal in number to the divisions, or letters, upon the dial I. They are, however, placed alternately on each side of the rim. F is the armature of the magnet, fastened upon a horizontal rod, sliding freely through the standards, 1 and 2. G. represents a spring, fastened to the frame J, and which carries back the armature, F, when the magnet has ceased to attract it. From the armature there extends downwards an arm, K, which, as it approaches the pin wheel D, presents two arms or pallets—one on each side of the wheel. These pallets are so arranged with regard to the pins, that if one pallet releases a pin on one side of the wheel, the same movement will cause the other pallet on the other side to arrest the motion of the wheel by its striking against the next alternate pin. H and I is an edge view of the circular dial, enclosed in a case, with a single opening at O; so that only one letter at a time can be seen. This dial, I is, in every respect marked as the disc in fig. 1.

Fig. 3 represents the two instruments—O, the *transmitting* instrument, and the right hand figure the receiving instrument. The wires *v* and *i* are respectively connected with *p* and *n*. It will be observed that the armature F is not attracted, and that the right hand pallet is checking the pin-wheel, so that the dial is stationary. If, however, the disé *t* is turned so that the circuit is completed, by the contact of the spring *e* with one of the ribs, instantly the armature is attracted by the electro-magnet, which will carry the right hand pallet away from the pin wheel, and which will then move by the action of the weight upon the barrel B, until it is checked by the left hand pallet, which had advanced to the wheel at the same time the other receded. This single operation has

Fig 3.



moved the disc one division, and the armature is still attracted. Now, let the disc *t* be turned until the sping *e* has been passed by the rib, and is in contact with the ivory only—instantly the current ceases; the armature F recedes from the magnet by the action of the spring G; this has taken the left hand pallet from the pin wheel, which is permitted to move until the next pin strikes against the right hand pallet. This has now brought another letter in front of the aperture at H. Thus, it will be seen that that the design of this instrument is to to bring into view, at the aperture, such letters as are required in transmitting a message.

Suppose letter A is at the point *b* of the *disc*, and letter A of the *dial* is opposite the opening. The instrument is now ready to transmit; and let the letter 1 be the first of the message. The operator gently turns the disc round in the direction of the arrow, so that each time the circuit is broken a new letter appears at the dial, and each time it is closed by the operation of the pallets, in checking and releasing the pin-wheel.

This is its operation until the letter 1 has reached the point *b*, when a short pause is made. The next letter H, requires but one movement of the disc, then follows A, then V, then E.

In relation to this instrument, Professor Daniell says: "We can only further briefly allude to two of the most important modifications of this invention, which Professor Wheatstone has made for specific purposes. By substituting for the paper disc, on the circumference of which the letters are printed, a thin disc of brass, cut from the circumference to the centre so as to form 24 springs, on the extremities of which types or punches are placed, and adding a mechanism, the detent of which, acted on by an electro-magnet, causes a hammer to strike the punch against a cylinder, round which are rolled alternately several sheets of white paper and of the blackened paper used in the manifold writing apparatus, he has been enabled to obtain, without presenting any resistance to the type wheel, several distinct printed copies at the same time, of the message transmitted."*

This invention of Professor Wheatstone, I critically examined in September and November last, (1845,) at the Nine Elms and at the Paddington station, London, and also at Amsterdam, in October. At Paddington, I gave a name of 19 letters to be transmitted, and requested specially that it should be sent and returned as speedily as possible, as I wished to test the number of letters that could be shown in a minute. The result was, that the name (after several failures to spell it right, and giving sometimes the letter before and sometimes the letter after the true letter in the alphabetic arrangement in the disc) was completed in one minute and a quarter, I inquired how many could be shown in a minute, and learned that ordinarily 15 or 16 letters, although 20, and even 24, had been recognised. This rate was corroborated at the Amsterdam station of the Harlæm and Amsterdam line, on which Wheatstone's disc telegraph is used. 15 or 16 letters per minute was the usual rate of transmission; but I found here, as at Paddington, that the disc did not rotate with correctness; often giving the wrong letter, so that the word was generally guessed at, and frequently required repetition. In this arrangement it will be observed that Professor Wheatstone uses but one circuit.

In Paris, in the latter part of October and beginning of November, 1845, I examined the telegraphic system in operation upon the experimental line, made by order of the government between Paris and Rouen, a distance of 85 miles. This system is an ingenious application of a rachet-wheel escapement, acted upon by an electro-magnet, to the movement of two arms, imitating the configurations of the aerial telegraph already in use in France.

The following is a concise description:

Fig. 1

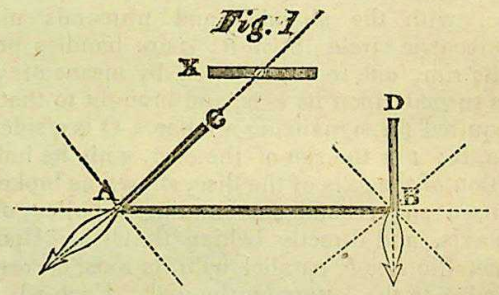


Fig. 1 represents the face of the telegraphic instrument; A B is a fixed dark line upon the face or dial plate; X is an arm having one motion on its centre in the direction of the dots; A C and B D are movable arms, turning on the pivots A and B respectively. The dotted lines are the various positions which each arm can assume, making, by their combined movements, 128 different configurations. The hand X, when horizontal, indicates that the sign is to be read horizontally; when inclined in the direction of the dots, the sign is to be read perpendicularly. This telegraph is operated by two circuits, one for the movement of each arm, the axles of which pass through the pivots A and B respectively; behind the dial and upon this axle is a rachet or escapement wheel of 8

*Daniell's Introduction to Chemical Philosophy, page 580, 2d edition: London, 1843.

cogs. The cogs of this wheel, connected with a clock train of wheels are released by the power of the electro magnet operating upon a lever. At every release of a cog, by the action of the magnet the arm takes a new position, assuming for an instant each intermediate position, until it comes to the one desired, when it stops. A single connexion and break of the circuit releases one cog.

With this arrangement M. Brequet states that 10 configurations or signs can be given in a minute. In a note, however, from Mr. Fox, the accomplished administrator of the telegraphs of France, he informs me that 28 have been given in a minute; but ordinarily it can only give 10 or 12, and *this* (it will be perceived) requires 2 circuits; consequently it gives at the rate of six signs ordinarily, or at the utmost 14 per minute, for a single circuit.

It will be sufficient to state that by my system I give, with a single circuit, at least 60 characters in a minute; not merely shown temporarily, but recorded in a permanent manner upon paper, to be read at any time.

The efficiency of the three systems will stand thus represented in figures:

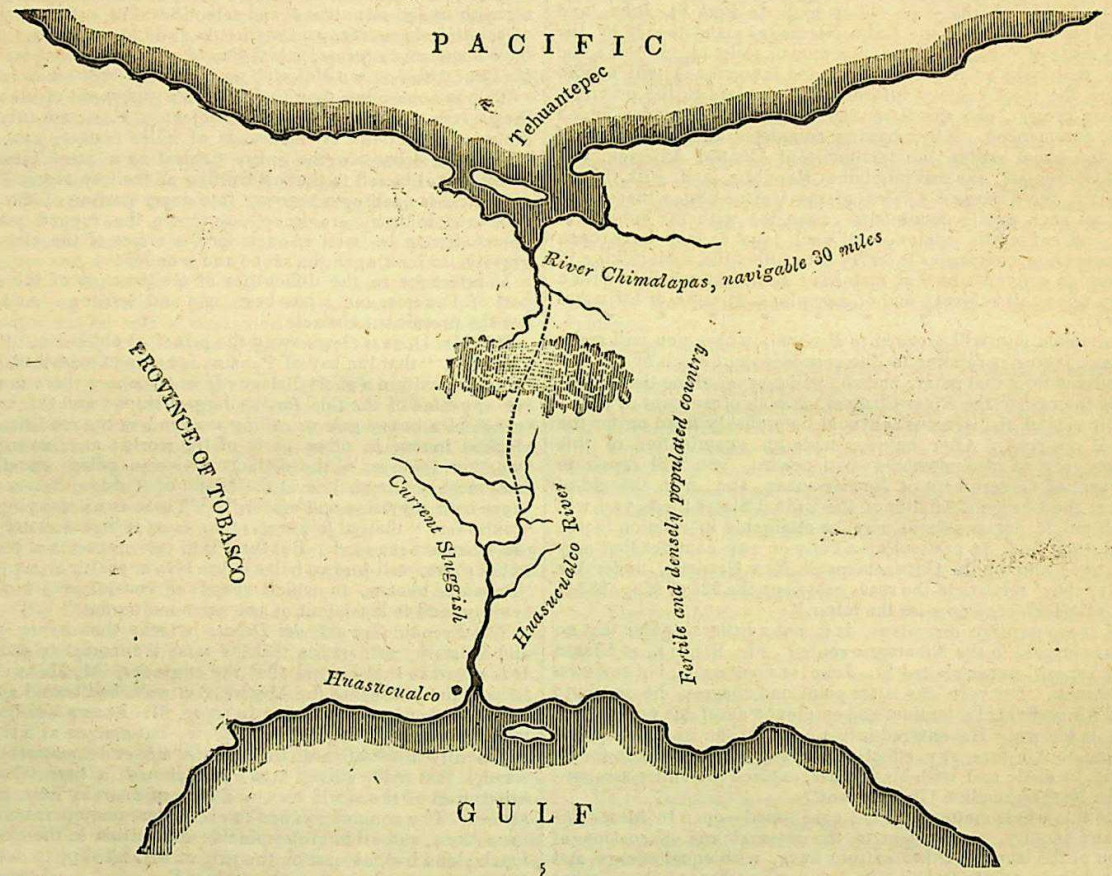
The American system, 60 per minute;
The English system, 15 per minute,
The French system, 6, or at most 14 per minute;

with the advantages in favor of the American, that the characters are made permanent and the operation of the instrument surer, the simplicity of the machinery rendering it less liable to be deranged by atmospheric changes or other accidents.

With sincere respect, sir, your most obedient servant,

SAML. F. B. MORSE.

Hon. Mr. BURKE.
Commissioner of Patents, &c.



LETTERS ON PANAMA,

BY THE HON. JOHN A. BRYAN.

WE deem no apology necessary, for placing before our readers, this Series of Letters upon Panama, the first of which will be found in the second number of the Mirror, (page 28,) from the HON. JOHN A. BRYAN, our late Chargé to Peru.

It will be remembered, that JUDGE BRYAN left this country, on his Mission in the fall of 1844, and after a few months residence at Lima, returned, crossing at Panama. Being disciplined to the brevity and rigorous requirements of editorial life, a ripe Scholar, and an experienced Statesman, he has not yielded to the temptations of the young traveller, and indulged in figures of fancy, but confines himself to pictures of nature as they are.

The connection of the Atlantic with the Pacific, is a subject becoming of daily interest, not only to individuals but to nations. All of whom appear to have entered the field, and are striving for the honor to be reaped in suggesting the most approved means for bringing about so stupendous, and so important a work to the whole Commercial World.

SECOND LETTER.

LIMA, (PERU,) APRIL 23, 1845.

DEAR SIR: I resume the subject of my last letter, upon the Isthmus of Darien and Panama.

As Mr. FORSYTH very appropriately remarked in his instructions to Mr. BIDDLE in 1836, "*the published accounts of these regions are scanty and imperfect.*" Recourse must consequently be had to such materials as are within our reach. Some of these have been gathered by our public agents; but we have seen that the canal route, by way of the River St. John and the Lake Nicaragua, has literally been untouched ever since the abandonment of the project by the Netherlands; and yet, in the judgments of hundreds of our most powerful intellects, and most sound discriminating minds, the proposed connexion of the two oceans is the most easy and natural of any in contemplation. Mr. CLAY, Mr. FORSYTH, Mr. VAN BUREN, and Mr. LIVINGSTON, when respectively at the head of the Department of State, gave all the points bearing upon this great question, their close attention, and most anxious inquiry. This is abundantly shown in all their instructions and correspondence; and it is to such men, acting upon the high responsibility of their stations, that we are to look for a fair and candid examination of so grave and interesting a matter of public inquiry. The journey of Mr. BIDDLE was particularly designated; his line of travel and investigation were specially defined; his duties, as will be seen, were plainly pointed out in the first letter of Mr. FORSYTH. I extract his instructions:

"You will proceed by the most direct route to Port St. John, and ascend the River St. John to the Lake Nicaragua; and thence by the contemplated route of communication, by canal or railroad, to the Pacific Ocean. You will make such observations and inquiries as will enable you to procure the most copious information in regard to the practicability of either project, and the time and circumstances under which either will be commenced. After having completed an examination of the route of the canal within the territories of Central America, you will repair to Gautemala, the capital of that Republic, and, with the aid of Mr. DEWITT, the Charge d'Affaires of the United States there, you will procure all such public documents connected with the subject as may be had, and especially copies of all such laws as may have been passed to incorporate companies to carry into effect the undertaking of any convention or conventions that may have been entered into with a foreign Power upon this subject; and of any plans, surveys, or estimates in relation to it. * * * * * * * * *

"From Gautemala you will proceed to Panama, where you will make observations and inquiries relative to the proposed connexion of the two oceans by a railroad from that point; and you will proceed along the proposed direction of the road to the River Chagres, or such other point or points on the Atlantic side of the isthmus as would be probably fixed on for the termination of the road. After having made an examination of this route as thoroughly as circumstances will permit, you will repair to Bogota, the seat of Government of New Granada, and, with the aid of Mr. MCAFEE, the Charge d'Afiaires of the United States there, you will procure such public documents as may be attainable in relation to the contemplated road; and, in particular, a copy of any contract that may have been entered into by the Government of New Granada, under the law of that Republic' relative to the road, passed on the 22d of May, 1834; a translation of which accompanies the letter."

In view of these positive directions, is it not a little singular that no attention was ever paid to the Nicaragua route? Mr. BIDDLE, as I learn from his own report, never visited St. John or Gautemala, but came on directly to Panama. Between the latter point and chagres, he seems to have directed his undivided attention, and employed all of his energies.

The result is known. He entered into a contract for an intermarine communication, but before any effective steps were ever taken for its consummation, he died; and, with his decease, expired the entire arrangement with the New Granadian Government.

This leaves this whole matter as it has ever stood—open to future investigation and inquiry, and subject to the research and discussion of every portion of the world. Other nations have, with equal energy and spirit, directed their efforts to this grand and magnificent scheme; but the great work has found no other existence than what the public archives display. A certain point is reached, and a long night of slumber follows.

England has taken her turn in this sublime project, and is still eager in the pursuit. Her plans are considerably matured for an effort, which, though less brilliant in prospect, will be more certain in its results A concise glance at the various movements of that powerful kingdom seems to be demanded in this place.

Great Britain has had her agents upon this coast, and various reports have been made of their investigaiions. But I believe that Government has only had *one full and specific report*, and that was made by Mr. LLOYD, who was associated with Colonel FALMARK, an officer of the Swedish army, each of whom were appointed by General BOLIVAR to make a complete examination and survey of the Isthmus of Panama. The great and permanent object of this procedure, as appears from the account given by Mr. LLOYD himself, was to find out the difference of level between the two oceans. This was ascertained, as would seem, from the subsequent statement of Mr. WHEELWRIGHT, then the agent and principal manager of the royal mail steam company, to be 13 35-100 feet; the Pacific being that much above the Atlantic.

Mr. LLOYD was of the opinion, as indeed all are who have thoroughly examined the subject, that the bar of the Chagres river is too shallow to admit its ever being made an outlet. A breakwater in Lemon bay has been suggested as more appropriate and feasible, and making a canal to the junction of the Gatun with the Chagres river. The Trinidad river is an important tributary to this stream, and the water is deep and durable at the junction. It was designed to run a canal nearly or quite parallel with the lines of the contemplated railroad, and either to make Chorrera or Panama a terminating point upon this ocean. The tides, and their rise and fall at the latter port, have been made the subject of some comment. They rise and fall, at full and change, nearly or quite twenty feet; the greatest variation twenty-seven feet. Mr. LLOYD comments particularly upon this very essential fact. He holds that this great admitted truth "gives such incalculable power to an engineer, that, by its means, almost every difficulty in water communication can be overcome."

Mr. LLOYD, in his investigation and survey, laid down two railroad plans; but this was done, he says, "to point out the most favorable direction for such a work;" and he then adds: "My proposal for a railroad, which should have been constructed of guallacan or lignumvitæ from the neighboring forests, was, in the first instance, to afford transport and bring into use the wonderful resources of the country, in its splendid forests, and its lime quarrying, and freestone."

In allusion to the practicability of a canal of the most magnificent cast, Mr. LLOYD hesitates not to declare (and he certainly examined the matter with much minuteness and scientific skill,) that, *in the present stage of scientific knowledge and engineering, he saw no serious obstacles, except the climate and expense, which should prevent a canal being cut to admit the largest ship in her Majesty's navy passing from sea to sea.*

This is none other than the deliberate judgment of all who have made themselves familiar with this subject. Mere speculative theorists, thousands and tens of thousands of miles distant, can, it is true, by wholesale, denounce the entire project as a mere visionary chimera. They should be left to the full fruition of their opinions. While modern enterprise is opening a passway into every portion of the globe, and science and industry are smoothing down the rugged mountains of the desert, it may be well enough for the stoics of the cloister, in solemn gravity, to look upon the scene and wonder!

In reference to the difficulties of *the junction* of the canal with the port of Panama, much has been said and written. And, in truth, here lies the prominent obstacle.

But Mr. LLOYD clears away the principal objection. "It is true," he observes, "that the bay of Panama is an open roadstead, but it is equally true that within a short distance from the shore there is sufficient water at any time of the tide for the largest ships; and the most rare occurrence of a heavy gale or rolling sea renders the roadstead safe as a landlocked harbor in other parts of the world; and, even in case of bad weather, there is, at the distance of seven miles, excellent anchorage and most secure shelter at the Island of Tobago, where ships can procure both provision and water." "There is no denying," he forcibly continues, "that, at low water, the coast is high and dry for a considerable distance seaward. But there is in various points of the bay, and close to the shore, well-known holes in the lava or rock; or, as they called it in Panama, huecos, in which vessels of considerable burden anchor securely, and independent of the surrounding flat."

The French *Journal des Debats* attacks the survey made by Lloyd and Falmark, and asserts that the same is incomplete and unsatisfactory. It is urged in that journal that the engineer, M. MOREL, who came out here in the interest of the Messrs. SALMON, had traced a line much more closen, and of less elevation. In reply, Mr. LLOYD admits that the survey made was in some degree incomplete, but assigns as a reason (which is sufficiently illustrative of the troubles and embarrassments they encountered,) that "the survey was undertaken at a time when the whole of that part of the world was in a state of anarchy from political dissensions. The commission had to encounter many personal privations and vexations, and all but interminable difficulties, in the execution of their task; and had, at least on the part of Mr. LLOYD, to defray a considerable part of the expense themselves."

The allegation that Mr. LLOYD was of the opinion that a railroad over the Isthmus was the best adapted to the make of the country, was entirely groundless. He fully explains the cause of his laying down two railroad tracks, in the quotation before made; and the very emphatic and unqualified manner in which he speaks of the ease of cutting a ship-channel from ocean to ocean, indicates with sufficient precision what were his views upon this subject. He is clearly convinced that either a canal or railroad would encounter no insurmountable obstruction; and in this opinion his fellow-countryman, Mr. WHEELWRIGHT, who met Mr. LLOYD in passing over the Isthmus, as I learn, fully concurs. The railroad was designed to aid the final accomplishment of the grand project of the magnificent ship-channel alluded to. Mr. WHEELWRIGHT, who spent some years upon this coast, and often passed over the Isthmus, made it his particular duty, in connexion with his official station, as agent and manager of the Steam Packet Company of England, to examine, rigidly and thoroughly, into all the various contemplated projects for uniting the two seas.

I shall need no apology to our country for here submitting a quotation

or two from the able report made upon this subject by Mr. WHEELWRIGHT to the Royal Geographical Society of England, about fourteen months since, which will serve to illustrate the main point under consideration.

This report was placed in my hands by a friend at Panama, and, being the latest one touching this great question, it has been perused with a deep and absorbing interest.

He readily unites with Mr. LLOYD in the conclusion that there is no height to overcome of any great magnitude, in effecting the desired communication; and this opinion is sustained and strengthened by that of every one who has given the matter any attention. I profess to know nothing, either practically or scientifically, concerning the precise heights and distances, or of any of those matters which belong more particularly to the engineering department; but, so far as the judgment of one who has passed over the Isthmus, who has climbed all the hills, squeezed through all the huge mule-paths, and risked his neck and heels among the winding ascents and descents, will deserve to be considered in support of better opinions, I do not hesitate to declare that I saw no mountain height or yawning precipice, no cloud topped cliff or gaping gulf, that could, in my estimation, shake the faith of the most stubborn of men in the entire practicability of constructing any of the proposed works from ocean to ocean.

I know it has been objected, and that too from high sources, that such is the present state of the country along the Isthmus, the indolence of the inhabitants; the unhealthiness of some parts, and the difficulty that must attend the procuring of laborers among the natives, as to forever prevent the accomplishment of the desired object. Some of these objections are certainly not without their force; but it seems in a great measure to be forgotten that the principal portion of the work will be among the hills, and along the valleys and ravines, where the constant rolling of the waters is a living token of the purity of the surrounding atmosphere, and a faithful pledge for the protection of all who may toil along their winding away.

Nor is the Chagres river, for most of the distance between Cruces and the Atlantic, in any sense obnoxious to the charge of unhealthiness. It cannot be so. The stream is too rapid, the water too clear, and the bottom and banks too solid and gravelly for the admission of such an idea. The current runs at the rate of about three miles an hour, and the indications of the timber and shrubbery that line its shores, all unite in repulsing the false notion, that, up to within a short distance of the town of Chagres, any alarming miasmatic malady prevails, or can prevail. This view of the subject has no sort of connexion with the notorious unhealthiness of the little, squalid, miserable looking concern at its mouth, and which it is intended by all to avoid.

The entire route from ocean to ocean is indeed strikingly picturesque and interesting. It is really worth the wearisome journey of a day to witness the scenes that everywhere meet your eye in passing this variegated landscape; but its history has scarcely any necessary connexion with the great question we are now considering. I trust I need no apology for this digression. We are all seeking after truth in the paramount and all-controlling subject of the grandest work of the world, the union of the two oceans; and it is with pleasure that I return to its consideration.

Mr. WHEELWRIGHT remarks, in his report before alluded to, that "the 'level is so complete that it would only be neeessary to have locks at 'either end of the canal, while its total length would not exceed 'thirty miles. The Chagres could be made its feeder, but the elevation of the Pacific above the Atlantic, would, I think, render the 'canal entirely independent of any tributary streams. Both of the termini 'would require artificial harbors, or must be protected by breakwaters. 'No substantial difficulty exists on this point. When the work is undertaken, ways and means will soon be found for overcoming all minor 'obstacles."

"All, however, (continues Mr. WHEELWRIGHT,) who are acquainted with the circumstances of the country, will, I think, admit that before so vast an undertaking as the opening of a great ship-canal can be commenced, it is absolutely necessary that a road be made as near the level line as possible, both with a view to ulterior labors, which such a road would greatly facilitate, and for the intermediate establishment of an intercourse between the ocean's.

In following up this new suggestion for a macademized way over the Isthmus, Mr. WHEELWRIGHT holds the following language:

"The description of the road best adapted to meet the object must be determined by a minute examination of local and tropical difficulties and peculiarities.

"I have long thought that a tram-road, with a iron rail, would be the most desirable, as it would be adapted to locomotive power when necessary.

"As this road will pass through a swampy tract of country, and be exposed to the effects of severe rains and torrents, the method proposed would probably be the most economical and efficient, and less exposed to injury; tho piles to be carried to the height required, which would generally supersede the necessity of bridges and parapets, while the expense would be very limited. All the material necessary for constructing such a road on the *spot*, excepting the iron; labor is abundant and cheap, the usual wages not exceeding four reals, or two shillings per day. It is true that the natives certainly cannot perform the labor of Europeans in Europe, but I am confident, in that climate, they would do more. In fact, Europeans could not withstand its enervating effects, while the natives, like the cutters of mahogany and dyewoods, are acclimated, patient of fatigue, simple in their habits, and temperate. They are content with the food of the country, which consists of charque, or dried beef, rice, and Indian corn; and are strong, athletic men, accustomed, many of them, to carry burdens of one hundred and fifty pounds weight across the Isthmus upon their backs, performing the whole journey of twenty-one miles a day.

"A great object would be gained," continues Mr. WEEELWRIGHT, "by the formation of such a road; the whole detention on the Isthmus, from ocean to ocean, would not exceed a few hours; Chagres (the town,) would be altogether avoided, and passengers incur no risk from climate. Goods could be transported with celerity, and at a trifling expense."

The allusions of Mr. WHEELWRIGHT to the particulars of climate, change of seasons, character and habits of the people, and their mode of living in this region of country, present, in a very condensed form, all that is really essential to be known on this branch of our inquiry. I copy from his report:

"For the information of those who are acquainted with the localities of Panama, and the difficulties and facilities to be met with in the transit of the Isthmus, the following remarks may be useful: The seasons are distinguished by rainy season and dry season. From June to November constitutes the former, and November to June the latter. During the rainy season, the journey from the Pacific to the Atlantic can be performed in two days, while in the dry season, twenty-four hours only are necessary. From the Atlantic to the Pacific, during the rainy season, three days are required, and in the dry season it can be accomplished in two days. This difference is owing to the swelling of the river produced by rains. The journey from Panama to Cruces, is performed on mules, being a distance of twenty-one miles, over a bad, but not a dangerous road. At Cruces, there are canoes of all sizes in readiness, in which passengers embark and descend the river to Chagres, the seaport of the Isthmus, where they re-embark on board the first vessel which suits their convenience. The transit of the isthmus during the dry season is neither inconvenient nor unpleasant; the canoes are covered; provisions, fruit, &c., are abundant along the banks of the river; the temperature, though warm, is perfectly healthy, and there is always personal security. During the rains, you are subject to great exposure, and consequent illness; but, were a good road once opened, and a steamer on the river, there would be no danger at any season, and the journey from sea to sea could be accomplished in eight or nine hours, without the slightest inconvenience."

Speaking of the facilities of transportation across the Isthmus, and of the great commercial importance of some opening from ocean to ocean, Mr. WHEELWRIGHT proceeds:

"The opening of a channel across the Isthmus to facilitate the transport of goods, must attract the attention of all commercial Europe towards that route, so much shorter and safer than the one now taken. The Government of New Granada, and the inhabitants of the Isthmus, take a deep interest, and are determined to make any sacrifice to carry into effect an operation which they know might draw over their *ocean bridge* from one side the raw and unmanufactured merchandise of India, China, Persia, the northern and western shores of the Pacific, of New Holland, Japan, and the innumerable islands of those seas, and on the other, the manufactures of Europe and North America.

"The possibility of such a result seems alone to furnish quite sufficient inducement to direct the spirit of British enterprise towards the Isthmus of Panama, and its neighbors, the west coast of Chili, Peru, Bolivia, Equator, and New Granada, on whose advancement British commerce has already a heavy and increasing stake."

Thus writes Mr. WHEELWRIGHT, who is, by birth, an American citizen, but who, until recently at least, has been employed in Great Britain, and particularly in the service of the Royal Mail Steam Packet Company.

No inconsiderable consideration is due to his opinions, although some of his views and reasoning have been controverted by some writers who may have imbibed all their notions entirely from less matured and intelligent sources.

But the Isthmus of Panama, strong and inviting as are her numerous advantages, stands not alone, as we have already seen, in contending for the high honor of this improvement. Nicaragua, as has been fully demonstrated in the correspondence between the authorities of Guatemala and North American statesmen, comes in for no ordinary share of the sought-for distinction; and writers of great eminence, notwithstanding the treble distance from ocean to ocean, have strenuously urged that for a great ship-channel, the river and lake route is entirely the most feasible and chosen. Such, too, until quite recently, has been the predominant opinion in the United States. Hence all the facts and circumstances connected with the survey of this route must be examined with attention. It is true that the late surveys and intelligence have all seemed to point to this isthmus as the most practicable, but it may be well to look to all the data and all the points, the better to arrive at a correct conclusion, and be able to make a wise decision upon this subject.

Two different routes traverse the river St. John, and the lake Nicaragua line.

The Port of Realejo, on the Pacific, is made a point in one of these propositions. The original plan was to connect the above named port with

Lake Leon, (35 miles long and 15 broad,) which is represented by scientific men who have carefully investigated the matter, as perfectly capable, from its depth, to float, with entire safety, the largest class of vessels that nail the ocean.

A considerable stream unites the two lakes, forming a complete connexion.

The other project suggested is, to connect with the Nicaragua by a direct cut into the Gulf of Papagayo on this coast. Lake Leon is ascertained to be of some elevation above the level of the Nicaragua; and this one fact, considered as it is, as particularly essential to the proposed connexion, has suggested the plan of making Lake Leon serve as an upper basin, and be made the main feeder to the canal.

As far back as 1781 minute examinations were had of these routes.

Humboldt took a level of the oceans, and with explanatory maps and charts marked out and defined the course with great accuracy. This celebrated historian was famous for his facts. He never attempted a measure of this character without fortifying it with every proof to bring it plainly to the comprehension of the commonest undestanding. A series of 347 levels were also taken of these routes (one hundred yards from each other) in 1781. Evidence of these matters, it is said, may be found among the old Spanish records of Guatemala. Don M. Galisteo, as appears from the public archives of that city, was the surveyor.

But, among other famous writers and scientific men, who, at different times, have taken a hand in the discussion of this subject, I find the name of Jeremy Bentham. He wrote in 1822, making particular allusion to, and resting his views upon, the opinions of Mr. Robinson, an American writer, and the author of *Memoirs of the French Revolution*. Mr. Bentham quotes from this work. A synopsis of his statements follows:

The ground between the two lakes is a dead level. The particular dimensions of the water on the Pacific not given. It is confidently asserted that the shore is entirely free from shoals and from dangerous rocks; and, particularly on the Papagayo coast, the shore is stated to be so bold and ample as to form a secure harbor, where vessels of any size can anchor close to the beach with the utmost safety. The river St. John, the low water of which stream sometimes compels flat-bottomed boats to discharge portions of their cargoes, presents the only difficulty, and is one which may be easily obviated, taking into consideration the magnitude of such a work.

Tehuantepec is yet another project. Don Jose de Garay ordered a survey of this Isthmus in 1832, '3, intending to follow it up by opening a communication between the two oceans. The investigation and minute survey of this new route proved to the entire satisfaction of the projector the great practicability of the measure.

From the statement I have seen of this survey, and the searching geological investigations connected with it, I should judge that it is scarcely exceeded by any effort that has ever before been put forth upon this subject by any nation or people. All the Spanish surveys bear the marks of great precision.

This Isthmus belongs to the Mexican Republic, and has a pretty dense population. Its history will be found in several published works. The inhabitants are among the most resolute, hardy, and athletic race of Indians in all that part of the world. The writer before alluded to (Mr. Robinson) thus speaks upon the subject of a canal:

"If, on a topographical survey of the Isthmus, it shall be found practicable to cut a canal, there is no place where such an undertaking could be accomplished with such ease as in the province of Oajaca. In its boundaries are comprehended a great part of the Isthmus of Tehuantepec. Its salubrity is unequalled on the American continent—even its shores on the Pacific ocean appear exempted from the usual diseases which afflict the inhabitants of the Atlantic and South Sea coast."

Many similar opinions are given upon the advantages and facilities of this route, and it must command a share of the public attention and inquiry.

I should like much, did my prescribed limits admit of it, to go further into an examination of this survey, and present a condensed embodiment of the collected testimony in its favor; but this must be left to those whose business it more especially is, and who seem called upon by high national considerations, to give the entire facts to the public in an official form.

Limits are denied me to make any thing more than this passing allusion to the report of the commissioners, which is certainly drawn up with great ability and force. But even these proceedings do not form an outer boundary to our inquiries; for we are referred back to yet earlier times, when other races of men, the traces of whose science and genius are to be seen in every quarter of this picturesque portion of the globe, sought out an avenue between the two seas. Hernando Cortez, whose brilliant successes and triumphs as a conqueror exceed those of any hero of his day, and whose armies marched to victory over a soil enriched by treasures that ages can never exhaust, was not unmindful of the sublime protect of uniting the commerce and trade of the two oceans, and thus to furnish the world with a passway for the immense mineral wealth that lines the hills and vales of the Pacific coast. The old historic records in the early Spanish archives of this country are filled with striking memorials of the immense riches and power that once held dominion over this great harvest field of revolution and conquest.

But that halcyon day has passed. Other scenes now surround us. A different people, although of the same parent stock, hold the sceptre of government, and the unalloyed blessings of social freedom seem to await the coming of that *change* which alone can bring back that renewed life and vigor which once shed a bright lustre upon the Spanish dominions in the south.

My next will be made to embrace a brief review of the late French survey of this Isthmus; a sketch of the Pacific coast; our possessions in Oregon; the various islands of these seas; their increasing trade and commerce, &c.; together with some notice of the movements now going forward by the Royal Mail Steam Packet Company of England.

With renewed assurances of consideration, I remain truly yours,

JOHN A. BRYAN.

Francis Markoe, Junior, Esq.
Cor. Secretary National Institute.

THIRD LETTER.

Chagres, (Atlantic side of the Isthmus of Panama,) Sept. 25, 1845.

Dear Sir: Again I find myself on the shores of the Altantic. My stay was too limited at Lima, to admit of my fulfilling the promise made in my last, to continue the correspondence from that country, on the all-absorbing subject of uniting the two oceans. But that great and grave question, a question to which the eye of the civilized world has long been turned with deep and abiding interest, has lost none of its importance with me, in consequence of my speedy return to my native land. This, as I trust, will be amply attested by what I am now about to write you.

Having taken the mule track over the mountains, from Gorgona to Panama, on my outward route to Peru, I embraced the present occasion of returning across the Isthmus by way of Cruces. This spot has become somewhat consecrated and famous among the travelling community of late, as the principal stopping place in their transit over. Leaving Panama on the morning of the 22nd September, at half-past 6, we arrived at Cruces, 21 miles distant, at 2 p m, of the same day, in seven and one half hours. This was considered a remarkably quick passage. Though in the midst of "the rainy season," when much suffering and unpleasantness is anticipated, not a cloud hung over us during the journey. We escaped every trouble and trial but fatigue, but found the scorching rays of a burning sun, which are ever more or less prevalent here, to be almost suffocating and intolerable. Indeed, the task is always a tedious one, and all my travelling companions, four in number, felt its severity most keenly; but the journey was a short one, and the hardships to which we were exposed, were consequently of a temporary duration.

Remaining at Cruces until the following day at noon, I was allowed the leisure to wander over this singular looking "city of the mountains," to gaze upon its enchanting scenery, and to wonder how a situation so favored and chosen, could have remained so far into the fourth century of American discovery and civilization, the mere sheltering place of a race of beings, so wretched and so destitute. It is emphatically, a *negro town*.—About 200 bamboo huts, irregularly dispersed along the banks of the Chagres, upon one almost untrodden and unbroken *green sward*, compose its dingy array of edifices,—except, perhaps, some one or two wood buildings, occupied as necessary places of rest and entertainment for the weary traveller. Here, 40 miles from the foaming Atlantic, and a little more than half that distance from the majestic Pacific, away up among the mountain heights, may the future historian recount the beauties of the rising city of the Isthmus of Darien.—But this can never be anticipated, until another race of men, those whose industry and enterprise know no lines of latitude or longitude, and whose indomitable courage and perseverance no opposing obstacles can shake, shall seek an asylum, and build up a city here.

Proceeding down the river in our thatched canoe, lined as are its banks with the thick shrubbery of a South American forest, we passed beneath the cooling shade of a thousand overhanging flowers, enlivened by the deep enchantment of the scene. Vivid and enduring must forever remain, a sight so inspiring to every visiting stranger,—a view that few of the forest scenes of the world can exceed in sublimity or splendor; nor could I muster sufficient of the philosopher to subdue those emotions of my nature, which here quite unconsciously forced themselves upon me in spite of myself. Were a stoic of the ninth century, with all his collected and callous propensities, to have been suddenly cast upon a spot so serene and lovely, he could scarcely have resisted the deep impulse which a river scenery so inviting is calculated to awaken. No longer facing the wintry storm, or shivering under frozen skies, every where around you, and over you, is the eternal bloom and freshness of the mountain evergreen,—while far down the declivity, in the wild solitude and shade of the desert, you hear the sparkling water fall, and listen to the songsters of the wood. Here, vegetation has no winter in its year—Alpine plants every where abound. The stately cocoa-nut and shady palm are here. The lofty Ceiba, also, of a most beautiful mountain growth, and the monarch of the Southern forest, is here—and here too, flourish the clustering orange, the delicious pine apple and Banana,—the tamarind and the plaintain, all combining their rich perfumes to sweeten this chosen retreat, and to adorn and beautify this rural harvest field of tropical nature.

The allusions above made, to the deep impulse of feeling with which I

was somewhat inspired when passing down the Chagres, is a mere incident of travel, which is ever more or less the accompaniment of all such descriptive scenery. It is true that such a river and mountain landscape does not always afford the like favorable impressions to every traveller—and, indeed, quite too high a coloring, in the view of some, may have been imparted to it in the present instance.

But my business is more directly and particularly with matters of history, with figures and facts, and hence I give the go by to all such ebullitions of admiration, and proceed to the main object before me.

A South American wilderness is entirely unlike those of the north. It is crowded with foliage. The undergrowth is thick and dense; and from this cause alone, it is not unfrequently rendered perfectly impenetrable to the traveller. Hence, that some trifling variance should have been found in the several levels taken, and estimates made, in reference to the contemplated improvement, can be no matter of wonder.

As we approached the little town of Chagres, on our way towards the ocean, the hills of the Isthmus receded from the view, the waters became muddy and slow, and indications of impurity and unhealthiness were too distinctly marked in every thing around us, to be mistaken for any other place than the one whose name it bears.

As our little canoe reached the shore, I was warmly greeted by our American Consul at Panama, who, it seems, had came over a few days before me on some official errand. His first salutation to me, was, "well, Mr. Bryan, we have good news from the United States." And, what is *that*, pray? "Why, we have just learned that your goverament has offered 'to loan this country a million and a half of dollars, at ten years pay day, 'provided the New Granadian government will proceed, forthwith, to 'make a Macadamised road between the two oceans, *entirely within themselves, and independent of all other nations.*" He proceeded to say, still further, that "a new minister had been sent out from the United States 'to Bogota, who, as he understood, was fully empowered upon this sub-'ject." In reply, I observed, that I had heard of this at Panama, just before landing there. That the visiting officers of the Customs, had announced it with much seeming animation and pleasure, on board the Packet, when a mile or two out from shore.

On landing and calling in at the Custom-House at Chagres, I found this same story was in every one's mouth. All were rejoicing over this cheering news, and a new spirit seemed to have got hold of the people here upon this subject.

The sequel I very soon learned. England, or, rather, THE ROYAL MAIL STEAM PACKET COMPANY OF ENGLAND, have recently had on here, some of their most experienced and scientific men, to explore this Isthmus for a *Macadamised road.* Captain LIOT of the Royal Navy, and Colonel MCGEECHY, Crown Surveyor of Jamaica, have spent months within the last year, in the woods here between the two oceans, in making a critical survey of the route. On making inquiry of a gentleman recently from Jamaica, I found that the Crown Surveyor of that Island, had gone to England, with all his maps, charts, notes, and estimates, and that the work was expected to be speedily commenced.

Now, although I was fully aware that an erroneous impression prevailed among the people of this Isthmus as to the offer of a loan from our country, (since such a proposition must have been based upon the preceding action of Congress,) still, I could read enough, and I know enough from this little indication, this united burst of popular feeling among the masses, not to be mistaken as to their wishes. The truth is, they have no great partiality for England. The feeling here is decidedly favorable to the United States. The preference of this passway is given to our own country over all other portions of the world. They dread its going into other hands. Our associations are felt to be more direct and intimate, and the principles of our form of government more congenial, than those of any other nation. Hence the deep feeling manifest upon this occasion.

But France and England are both resolutely intent upon the command of this Isthmus. Alternately, they have long been shaping their course for its exclusive control; and their respective proposals and stipulations, from time to time, have neither been stinted or few for all such securities, grants and safe guards, as, when accomplished, would effectually protect them in its occupation. A commission from the King of the French, has recently returned to Paris from a year's tour here, upon this very errand. Their Report was laid before the French government, and a synopsis of it has reached this country. Meanwhile, THE ROYAL MAIL STEAM PACKET COMPANY are cautiously and stealthily moving forward.

Already in command of some twelve or fourteen of the newly built, and splendid *two thousand tons steamers*, running to the West India Islands, and touchhing at several points upon this coast, they are watching with eagerness every avenue of intercommunication, ready, at any onset, to *strike*, when the blow will be most fatal and effectual. And now, while I write, one of this huge class of ocean Steamers, with England's broad banner floating over it, lies ont in Port before me. It promises to afford me the only means I have for a conveyance to Jamaica and to Cuba, on my return home. These *reconoitering Steamers of war*, are all officered from the British Navy. Heavy cannon form their ballast; and their upper decks are so lightly constructed as to be easily converted, in a few hours warning, into efficient and effective engines of war. All this can be effected in less than 48 hours. This new "*Experimental Squadron*," as we are aware, is ostensibly, IN THE ROYAL MAIL SERVICE of England, and it is even true that a heavy sum is annually paid the company for the transmission of the British Mails to the several Colonial Islands in these seas, as well as to Carthagena, Santa Martha, St. John, Chagres and Cuba, where it is regularly conveyed.

More than two centuries since, Sir WALTER RALEIGH, pronounced this Isthmus, "the great key of the world;" and what an array of intelligence, of mind, of intellect, has since given sanction to that opinion. Succeeding generations in Europe warmly discussed the project.—The Earl of Chathman was its early advocate and *friend.*—The Lords and Commons of England, as well as the French Chambers, have at sundry times. had it spread out in bright array before them. M. Guizot, the great financial leader of France, has raised his voice loudly in favor of the proposed union; and many of the shining luminaries of monarchy over the water, are, at this very moment, in hot pursuit of this grand sheme of commercial enterprise, so promising to their future hopes of aggrandizement and power. CORTEZ, as we have seen, too, early saw the entire practicability and value of this mighty measure; and the immortal Columbus, whose bones now lie encased within the walls of the grand Cathedral at Havanna, and who sunk to the grave the victim of persecution and ingratitude, was scarcely willing to leave the world until this, the darling object of his hopes, scarcely second to the act of discovery itself, should have been fully consummated.

By the speedy execution of this great work, how easy and natural will be rendered the circumnavigation of the Globe. Such a voyage can then be accomplished in less than one hundred days.

American bread stuffs will then float upon every sea, and feed every land. A little while hence, and a new Western Star beyond the mountains will expand, and freshen the commerce and trade of the whole Pacific coast. Fine markets will then beckon us to their embrace. New scenes will open around us, and an active and busy trade will ensue. Already this renewed spirit of enterprise is felt on those distant shores. Two regular Packets, as I have been credibly informed, now ply between Oregon and the Sandwich Islands. Oregon wheat already constitutes the main supply of breadstuffs for the Sandwichs. At these beautiful Islands, too, all our Men of War in that ocean, and the principal Whalers now constantly entering Honulula, the Capital of Oahu, seek their regular stores. These flourishing Islands are on the highway to Eastern India, and already has the foot tread of American industry grappled with their inviting prospects, and expanding importance. Our anticipations of the rapid growth of these Islands have scarcely kept within hailing distance of the reality. Society there has recently undergone a complete transition from the degraded and distracted condition of barbarism, to a state of civilization and improvement. Indeed, all the social relations of life, particularly at the Capitol, have, of late, become so completely Americanised there, as to afford nearly every comfort and pleasure common to our own land and country. English and French are also there; enough from many distant lands to render it, emphatically, a mixed population of enterprising Foreigners from other climes.

The expense of living is one great and paramount inducement to a settlement in these Islands. It is astonishingly cheap. By a recent statement made in a Honulula paper, it would seem that the average cost of the inhabitants, per day, is little over one cent. Everything adapted to tropical climates grows here in great profusion. The main articles are rice, maise, wheat, potatoes, yams, bananas, sugar, coffee, beans, peas, onions, radishes, melons, pine apples, cheremoyas, oranges, lemons, figs, olives, tobacco, cocoa and cotton; besides all kinds of berries, indigo, mustard, hemp, &c., &c. Cattle and horses also flourish well there, and nothing, indeed, but the awakening spirit of public enterprise now abroad, and a fair proportion of Foreign capital to drive it forward, is wanting to render these beautiful Islands the very garden of the world. And they stand not alone in the broad catalogue of distant regions, celebrated for fertility and value. Others, though less settled and improved, checquer over nearly every portion of the Pacific. New ones are constantly finding a place upon our maps and charts. Some already there, besides those just alluded to, are rapidly rising into importance. They all go under the name of "THE POLYNESIAN ISLANDS," from a Greek compound, signifying "many Islands." These several groups stretch into all parts of the northern and southern oceans.

The English have built up, and are rapidly peopling, the Island of New Zealand. The group called Navigators Islands, and some others, far in the Southern seas, are also commanding the attention of the British nation. The French are fortifying Tahiti, and calling it theirs; and different portions of the Marquesas and Society, the Fejees, Tonga and Somoa, are exciting more or less of the rival ambition of contending monarchies, now struggling for their complete control and mastery. It is but recently that this aspiring rival spirit, came near involving England and France in an exterminating war. The English Consul then at Tahiti, (the Rev. Mr. PRITCHARD,) who was also a missionary there, was charged by the French authorities, then holding the power of the temporary government at Tahiti, with a seditious intermeddling with their affairs, and was consequently taken home to England, in a French vessel. I believe, however, that this difficulty was finally adjusted, but the principal instrument of the conflict never returned to the scene of his former labors. He was subsequently despatched upon a similar duty, as I learned, as a sort of make shift, to the Navigators Islands. I saw him, at Panama, and also at Lima, when on his way to his new destination.

And how stand our more immediate business relations in the Pacific ocean? Independant of the number of American freemen already settled upon the various Islands throughout those distant seas, no less than 500 fine,

well stored, WHALE SHIPS, bearing the American flag, and all of which must look to our country for protection in the hour of danger, are in constant employment in those waters. Of the 700 Whalers now sailing from the United States, more than two thirds are in that ocean. These keep in active employment over 14,000 men. The annual quantity of oil derived from this tremendous whale fleet alone—a fleet that may well excite the wonder of the world, will not fall short of from three hundred thousand to three hundred and fifty thousand barrels; nor is this all. There is another essential article of value connected with this traffic. I am informed that more than two millions of pounds of Whale-bone annually accrue to the Whaling interest in those seas, from this prolific source of yankee enterprise. And what a witness have we here of the onward course of American industry! Who will think of staying its march? Where shall we fix its limit? Behold the contrast we are enabled to present.

Two of the most powerful maritime nations of the earth are those aggrandising monarchies, England and France.

They hold an almost exclusive dominion in every sea; and yet, in point of *Commercial marine* in the mighty Pacific, they are greatly our inferiors. By a late Sandwich Island Journal, I perceive the number of Vessels entering the Port of Honululu, for 1843, stood thus: American, 109; English, 7; French, 14!! And yet our present Naval power throughout those waters, is less than one half of either that of France or England! And, Sir, should we still linger on in a deep mesmeric slumber; should we yet choose to sleep upon a magazine, as to the contemplated union of the two oceans at this point, or within a few degrees of this point, where will be our future security? Once imagine one of the most powerful European nations, the denominated "*mistress of the seas,*" to hold the exclusive right of way over this Isthmus, either under a charter for a Rail Road, or a Ship Canal, and where, I ask, would be the protection of American freemen? And echo answers, *where?* Yes, *where, then*, would the thousands, and tens of thousands of our industrious, emigating sons, look for security? I confess, for one, that I cannot glance at this appalling condition of things without being deeply moved. Others may not see it as I see it. I cannot answer for them, in this particular. It is enough for me in this my second passage over this Isthmus, to *feel* its vital importance, and to raise my feeble voice of remonstrance, humble as it may be, to a longer continuance of that culpable neglect and indifference which is now so manifest in the United States upon this great national question. Our country has never yet had even a *survey* taken of either of the contemplated routes. At this moment, I am on the spot, where, if I had but half an eye, I could scarcely fail to see what is now in agitation. The Macadmised road heretofore referred to, is the mere entering wedge of a mightier undertaking. That measure is to be a ready means of immediate transit from ocean to ocean, and will be found immensely convenient for the accomplishment of a higher purpose. We have already noted the sensible allusion of Sir Walter Raleigh, constituting this, "the great key of the world;" and if we would be wise in time, we must take good care or that very *key*, exclusive in its use, will be found securely fobbed away in the huge pocket of the British nation.

This interesting point, (althongh no real road has ever been in existence here, since the destruction of the old Pizzaro road, and nothing but a mere mule path now leading from Cruces to Panama,) has had its day of glory and of triumph. Hundreds of millions of Gold and Silver, in the bloody times of the Pirate Morgan, and the Buccanneers, came over this deep trodden track, worn down as it is by the weight of the booty of that disastrous age of desolation and slaughter, on its way to Europe.

And through this very route too, that cruel scourage of his race, the insatiate *Pizzaro*, after rushing to the conquest of Peru over the fallen victims of his avarice and ambition, and butchering 5,000 innocent, unoffending Incas at Cuzco in a single day, transmitted his accumulated millions of specie and diamonds to the Spanish Court. But I turn with heart stricken horror from a scene so disgusting; and must crave your pardon for this incidental allusion to one so utterly devoid of every attribute of humanity. His life was the final forfeit of his butcheries and his crimes. He was finally assassinated in the Palace at Lima, and his mortal remains, unhonored by a sepulchre, have been crumbling for centuries under the Catholic Cathedral of that city.

An intermarine passway of some sort is loudly demanded here; and immediately connected with the accomplishment of that end, will arise the necessity of placing a line of American Steamers, to run regularly between our country and Chagres, and between Panama and Callao, as also to the Sandwich Islands, in the Pacific. And even now, at this very period, that step is loudly called for. One or two of this class, of proper dimensions, should be speedily placed in communication with the business of the whole Pacific coast, which is daily and hourly growing into importance.

While stopping a few hours here, my eye accidentally fell upon an article in a late New York paper, wherein the subject of a Rail Road across the Rocky mountains is discussed. I read this communication, I assure you, with great care and avidity. It strikes me, however, as rather too early to enter upon a scheme so expensive, so grand, and so magnificent. Such a project requires the developments of time. I believe it will eventually be accomplished, and that, within the progress of an average generation, (33 years,) the smoke of the locomotive may be seen on its winding way, through "the Great Pass," to the distant Pacific. But we need be particularly cautious at this juncture, or, while thus directing our eye, a work of less than one-fortieth of its cost, and yet of mightier magnitude, will make a *great pass* into other hands. We cannot well shut our eyes to the recent ondit of the day in circulation, that a gigantic and grasping power, has its appetite now fastened upon a scheme so vast that its future development is to shake the earth to its centre.

Sordid ambition never slumbers or tires. The cupidity of the world is never quiet or inactive. Monarchies may combine for self protection, and our infant Republic may yet be sought out as their first and most natural victim. It may at least be well that we are found sufficiently watchful of surrounding dangers. Although I would by no means deprive those rival nations, England and France, of the least particle of that good feeling they seem disposed recently to cultivate, yet their late paternal embraces, and rapturous overtures of mutual affection, have well become a matter, to *some*, of no ordinary amazement and wonder. What else but a significant squinting at a combination of interests and purposes, could have meant the recent speech of Louis Phillippe, made at Windsor Castle, to a certain commercial deputation from London, and which was so eagerly caught up by the "NEWS" of that Metropolis? The King of the French there most spiritedly proclaimed, that "*one infallible recipe was left the two nations;*" "*join,*" *says he,* "*your money with ours, and 'let us make Rail Roads Peace and amity must follow that community of 'interest, and that constant communication by Steam, which approaches 'nearest in rapidty to the interchange of thought.*" To this the Editor of the "NEWS" cheeringly adds. "*On the road to Boulogne, this revolution 'is already begun—in a year or two, you may breakfast in London at 8, 'and dine at 6 in Paris.*"

Upon the very heel, as it were, of this significant speech of the King of France, made on British soil, and in the presence of British Noblemen, the idea was first broached in France, (and to which no dissent was ever offered,) of placing a French Catholic of the Royal blood upon a throne to be created in Mexico! This may indeed be a day for building up thrones and dynasties among the allied Sovereigns of Europe; and, when no fitting ground shall be left at home on which to erect them, they may, indeed, seek to transplant them to Foreign climes; but they will find rather an uneasy seat on this side of the water. An intolerant spirit, in this regard, is uppermost, even among the excited revolutionists of Mexico. Military despotisms are inclined to recognise no lines of descent but those resulting from the bayonet and the sword. Let the good work of freedom go forward as it has begun, and every monarchy in christendom will soon be made to feel its power Crowns and sceptres will crumble before its march. It is an article that is ever gathering strength in its onward course; and if the present enthusiasm of public enterprise shall long remain undisturbed among us, nature's great passway over this narrow connecting link between two great oceans, will yet be successfully opened to the expanding commerce and trade of our advancing country.

The animating spirit of public improvement is not only alive in our own land, but it is taking rank hold in almost every portion of the Globe. It has had, it is true, to encounter some discouragements but its race is *onward*. Old systems and creeds are fast vanishing away, and new ones are usurping their places. How very recent do we find the earliest demonstrations in this noble system of internal improvement even in enlightened Europe. The Duke of Bridgewater, amid ten thousand disheartening rebukes and sneers, was the first to lead the way in opening the grand canal from Worsley to Salford. Pledging his whole private fortune upon the issue, and after draining the last dollar from all his friends through loans, he finally triumphed in an enterprise whose unexpected success was the wonder of all Europe. But at times, such was the severity of the ridicule to which he exposed himself in this his first experiment, as to be almost past endurance. Indeed, the very Engineer, whose advice he had sought to fix upon some plan to carry the Canal, by an aqueduct, over a certain water course, is represented to have exclaimed, on arriving upon the spot, "*I have often heard of Castles in the air, but was never before shewn where any of them were to be erected.*" But the indomitable courage and perseverance of the man was yet unshaken. The work was finally finished; and its bold projector died with all its clustering honors floating over him, one of the richest noblemen in England. But such was the natural timidity of the world in its early improvements and undertakings, that the bare mention of a *London Bridge*, or the tunnelling of the Thames, even but a few years in advance of their execution, would have frightened half the Bookmongers and placemen of Paternoster Row into spasms.

Now, how vast its mounments of enterprise,—how boundless its power and its possessions! Distant nations have caught the thrilling enthusiasm of its advancement. Ancient Egypt, once the cradle of science, and the seat of learning, is awaking from her long night of decay, and looking forward to the consummation of a work that is soon to unite the Red sea with the Mediterranean. Distance is beginning to be obliterated, and time almost annihilated. The great desert is about to be opened, and ancient Alexandria, the early store house of Commerce, and once the mistress of the world, may yet arise, Phenix like, from the ashes of her fallen glory. Once the battle field for the mastery of Rome, her decline was but a sad memorial to the spirit of her sons. Now, she may revive her hopes, renew her draught upon the commerce of the Indies, and look for a successful run in the trade and intercourse of nations. And does our own land receive any fresh incentive to effort from these glowing and clustering *Foreign examples?*

Does the greatest commercial avenue the world ever witnessed, yet remain securely locked up, in its own native element, at this Isthmus?

Have we no great national interests to look after in this direction? Can we see no danger in the movements now in progress here? Have we nothing at stake? No Merchant marine to protect? No national purposes to be fostered or advanced? Shall we bid a final adieu to the business and intercourse of these seas?

Where lies Cuba? and where the Mexican gulf; and all that entire frontier coast, washed by the Caribbean sea? And, where too, are Oregon and California, and the rich and productive Islands of the Pacific? These are not matters to be idly passed over. This is emphatically an age of great undertakings—of vast and astonishing enterprises; and how rapidly are these great movements multiplying across the water.

The very ocean steamer, to which allusion has been before made, brought out the bearer of Despatches from London. I met him in crossing the Isthmus, on his way to the British Minister, at Lima.

At this great national crisis of public affairs between the two governments, those *Despatches* are, no doubt, of deep public interest and importance.

Dissentions of a threatening character exist between the United States and England,—and the great misfortune to us is, that the intelligence, in charge of this British agent, will reach British hands in Peru, far in advance of all intelligence from our own land. It may be in the pockets of the English squadron at Callao, for months, before a word shall be received from the United States. How mortifying the reflection to true American spirit, that most of the valuable news from the States to our Naval force in the Pacific, comes to them *by way of England!* Yes, sir, humiliating as is the admission to the pride of an *American* freeman, it is no other than a startling fact, that the commanding officers of our Pacific Squadron are often compelled to look to the *London Times* for their intelligence from Washington. Thus, we see, that the principles of American policy, and the doctrines of our government have first to pass through the significant ordeal of the organ of the British throne!!

The whole world seems now to be in deep agitation and excitement. Invention and discovery are every where opening new fountains of wonder; nor are the United States behind any portion of the Globe in this particular. Some among us, it is true, are doubting, halting, and hesitating. No matter what the project, we are sure of dispeptics and stoics enough to pronounce it impracticable; but recent experience has shewn us that the word *impracticable* has scarcely a necessary place in the vocabulary of American industry. The grand Canal of New York, the first of its kind in America, was, at its inception, pronounced *impracticable;* and the idea of establishing Rail Roads over our country, when first espoused, was deemed almost a modern monstrosity. And yet, we have now, I believe, about 4,500 miles of Canal, and nearly or quite 4,750 miles of Rail Road in active use, and in construction, in the United States. No, we have little need of so often repeating here the word *impracticable!* It forms not an integral part of the creed of the great mass of American freemen. *Onward march,* is the modern anglo Saxon substitute; and this is fast cleaving down every opposing obstacle. The *current* has commenced its course, and it cannot be arrested. Emigration will not, and cannot be intercepted. The great deep of despotic rule, seems every where to be breaking up, and it is with pleasure that I look forward to the hour when the enlightened principles of civil liberty will be engrafted into every nation and government claiming civilization and intelligence on the earth. American enterprise can find no stopping point, or *resting place,* but in success. It will roll on, and that, I trust, forever. We might as well attempt to dam up the Cataract of Niagara, or to poke back the foaming torrent with a shingle, as to ever dream of staying that onward impulse now pushing forward the hardy sons of liberty towards the setting sun. "WESTWARD THE STAR OF EMPIRE TAKES ITS WAY,"—and SOUTHWARD, too, the twinkling of that same STAR may be seen in the distant horison, a witness of the past, and the harbinger of the future. Let no one presume to set bounds to American adventure. Its deep flood-tide cannot be arrested or staid. It will go on, until, perhaps, the very spot, where I now sit, or within a few degrees north of it, may form the Southern boundary of the North American Union.

And how, at this great crisis, stand the efforts of the U. States, in reference to this interesting connexion? Where is the evidence of that bold activity and exertion, without which, so far as relates to our own land, this all absorbing enterprise at this Isthmus, must forever languish and die? Do we stand by the side of either England or France, in this important particular? Are we not, in truth, in reference to this question, most lamentably behind every other rival maritime power of the earth? Where is our commerce and trade in the Caribbean sea? Scarcely an American vessel of any class whitens its waters. We are literally unknown there; and not one solitary foot of ground have we within the tropics. England, France and Spain command it all, except those portions now under the control of native occupants and owners. Foreign monarchies have an iron hand upon those fair fields of abundance and wealth.—And they may HOLD ON to their possessions, until our prosperous and expanding union, in the future enlargement of its bounds, shall go South "for quantity" beyond the 26th line of latitude. All the great rivers of our continent take a Southern direction: this faithful index, fixed by the finger of the Almighty himself, points, unerringly, to that coming destiny which awaits the march of liberty over the world. And it is useless to be figuring up any other result. That day may, indeed, be now near.

And if such an extension of liberty's domain shall flow as the natural result of the general march of intelligence and civilization, now advancing with giant strides over the face of the earth; if in forwarding the great ends of rational freedom, the shackles of despotism shall fall from their victims; and if in conflict with no treaty exactions, and in violation of no international obligations, such is to be the day of our future triumphs, every true lover of liberty, and every philanthropist and patriot throughout the civilized world, must unite their hearts and their hands in exclaiming, LET IT COME The decrees of Providence are certain to go on to their fulfilment. The last great trial of Liberty is yet to be had. Freedom and intelligence are travelling companions; and future history will fully shew their entire competency and ability, however strongly repulsed, to MARK OUT AND DEFINE THEIR OWN BOUNDARIES."

With usual assurances, &c.,

JOHN A. BRYAN.

FRANCIS MARKOE, JR., ESQ.
Corresponding Secretary, National Institute.

Note.—We are indebted to J. M. Shively, Esq., Post Master of Astoria, for the map representing the contemplated route across the Isthmus, from the river Huasucualco on the Gulf side, to Tehuantepec on the Pacific; who in his letter remarks that "the surveys are taken from actual observations made by Commodore Moore of the Texas Navy, and Capt. Levy also, both of whom have spent much time in that country. The whole distance from sea to sea according to these gentlemen, is 138 miles. The Huasucualco is navigable for ships 40 miles, and for boats 20 miles. The river Chimalapas on the opposite side of the Isthmus, is navigable 30 miles, which reduces the distance by land 48 miles. The route from New Orleans to Tehuantepec is 1200 miles shorter than the route by Panama, and far preferable, having a good road across a gentle montain, free of land slides.

WHITNEY'S PROJECTED RAIL ROAD.

The route proposed by Mr. Whitney for his rail road, proceeds from Lake Michigan across the Mississippi above the mouth of the Wisconsin, thence across the Missouri above the mouth of the Great Platte, between the Council Bluffs and the Great Bend, a little below lat. 43, and thence to the Great South Pass, about lat. 42, 30, and thence along the valley of Lewis River, which is the Southern main branch of the Columbia, to the head of ship navigation upon the latter, or to the bay of St. Francisco, as may hereafter be decided. Taking the Great South Pass as a point of departure Eastward and Westward, our first object is to ascertain the respective distances and elevations. According to Col. Fremont, quoted in the report of Senator Breese, the elevation of the highest point in this Pass, above the Gulf of Mexico, is 7490 feet. Col. Fremont, who explored the valley of the Great Platte, from its mouth to this Pass, in 1842, describes it as an open Prairie region, with an ascent almost or quite imperceptible by the traveller. He was accompanied by a Mr. Carson, who has resided in that region for 17 years, who had frequently crossed the Pass, and was thoroughly acquainted with the route. Yet with all his experience, he was obliged to watch very closely, to ascertain when he had reached the culminating point of the Pass through the Rocky Mountains. The distance of the Great Pass to the mouth of the Kansas, is 962 miles, and from the mouth of the Platte, 882, the latter being about 300 miles higher on the Missouri than the former; and as the mouth of the Kansas is 700 feet above the Gulf of Mexico, and that of the Platte a trifle more, the average ascent from either point to the Pass, is only about 7 feet to the mile. And as the distance from Lake Michigan to the Pass is 1400 miles, and that between the Lake and the mouth of the Kansas or Platte a level country, the average ascent from the Lake to the Pass

does not exceed 4½ feet to the mile. According to Col. Fremont, the mouth of the Kansas is 700 feet above the Gulf; the crossing of the Republican Fork, 516 miles farther, is 2300 feet, giving an ascent of 4⅔ feet to the mile; the ascent of the next 128 miles is 1000 feet, or about 8 to the mile; that of the next 107 miles, to St. Vrain's Fort, is 1000 feet, or 9 to the mile; that of the next 80 is 1300 feet, or 16 to the mile; that of the next 18 miles is 800 feet, or about 42 to the mile; that of the next 87 miles is 200 feet, or 2¼ to the mile.

The distance from the Great Pass to the mouth of the Columbia, by the common travelling route, is 1400 miles, and to the head of its ship navigation about 1230; and as the elevations of the Pass is 7490 feet, the descent from this point to ship navigation gives an average of about 6 feet to the mile. From the Pass to a distance of 311 miles, the descent is 1490 feet, or less than 5 to the mile. For 234 miles more, the route is level. For 540 miles more, the surface is irregular, and the next 178 miles end at an elevation of 3000 feet; the descent from 6000 to 3000 feet, over a distance of 718 miles giving an average of less than 3 feet, though that of the last 178 miles is 17 feet to the mile. From this point to the foot of the Blue Mountains, 282 miles, the elevations and depressions give an average of 10½ feet to the mile; and the remaining distance to Fort Vancouver, the head of ship navigation, 308 miles, gives an average of 3½ feet. All these elevations were taken by Col. Fremont, over the route usually travelled, though the committee suggest that future explorations will discover routes of less distances and ascents.

RAIL ROAD INTELLIGENCE.

Several Patents were granted during the years 1844-'5, for valuable inventions and improvements in Rail Road Machinery.

SWITCHES.

Among the most important, is that of the Switch, constructed to guide the cars from one track to another, patented in 1844.

This invention consists in the employment of two parallel bars attached to, and moving with the switch, so that, when the switch has been shifted and put in connexion with the turn-out rails, they are in line with the rails of the main track; and, in the event of neglect on the part of the attendant to replace the switch, a car from the main track will run on to these parallel bars, which are at their fixed end, connected with the main track by means of inclined planes and guides, so arranged as to elevate the flanch of the wheels (which are outside the track,) over the rail, and guide the whole of them to the line of the track, and thus prevent the cars from running off.—*Ellsworth's Report, page* 497.

SNAKE HEADS.

Many accidents result from the manner of uniting the rails at the junction of the sections; for, if they separate sideways or vertically, forming what are called "snake heads," either the flanch or tread of the wheels is caught, and the car thrown off the track; and hence many devices have been resorted to, to prevent such serious results. The general mode practised is the insertion of the ends of two contiguous sections within a block of iron called a "chair," and secured therein by screw bolts or wedges; but the tremulous motion communicated to the rails by the locomotive and train of cars in a short time loosens the screws or wedges, and therefore it becomes necessary to employ men along the whole line, to examine these fastenings carefully. To remedy this evil, it has been proposed to make the key or wedge with a spring catch on the end; which, when fully inserted, catches on the outside of the chair, and prevents it from being thrown out. Another mode has been suggested in England, which consists in making the key or wedge hollow, and therefore elastic. As a substitute for these chairs, and screw or wedge fastenings, it has been proposed to cast the sections of the rails with webbed flanches on the sides and towards the ends; the flanches on one section projecting beyond the end of the rail, to embrace the contiguous section, the flanches of which do not extend to the end. And, to prevent the rails from breaking by violent concussions, they are cast on wrought iron rods.

As a means of preventing accidents from "snake heads," or the ends of rails thrown up out of the proper line, a patent was granted in 1844 for attaching curved and inclined guides to the car in front of the wheels, and between the front and back wheels, which strike the "snake heads," and force them down to their proper position until the wheels pass over them.—*Ib.*

CAR WHEELS.

The breaking of cast iron car wheels, in consequence of the strain which the metal undergoes whilst shrinking and cooling in the mould, has been a source of great expense to rail road companies; and, therefore, many expedients have been resorted to, to discover some plan of preventing this evil. The hub has been connected with the chilled rim by means of a dished disk; but this was deemed objectionable. A patent was granted in 1844 for making the disk in such a form that a plane bisecting the wheel in its axis shall present a waved line, or one having a convexity and concavity on each face. Many such wheels have been made in the city of Boston, which are spoken of in terms of commendation.—*Ib, page* 498.

TRACKS.

Several Patents were also granted the same year for arranging the tracks of rail road cars with the view to obtain a greater amount of strength with a less weight; to adapt the trucks to the turning of curves on roads, by having each wheel in a separate frame, so that the axles can be thrown in the radii of the circle.—*Ib.*

COUPLINGS.

A patent was also granted for a mode of coupling cars, so that one car deviating from the line of the succeeding one, to a greater extent than is required to follow the curving of the road, forces open a spring clasp on the coupling, which liberates the coupling-pin, and thus permits the forward car to run off, without carrying with it the whole train.—*Ib.*

OIL BOXES.

Letters Patent were also granted for improvements in previously patented oil-boxes for the journels of rail road cars, contrived with a view of preventing the introduction of dust, &c., and the escape of oil.—*Ib.*

ANTI-FRICTION BOX FOR AXLES, &c.

The anti-friction box for axles, in which the axle, turns upon friction rollers, has heretofore been liable to serious objections—which appear to have been to a

great extent removed by an improvement patented in 1845. The inconveniences heretofore experienced, and the inventor's mode of obviating them, will be understood by reference to the following extracts from his patent:

"The nature of my invention consists in providing the axle and box with beveled or mitred shoulders or collars, in connexion with anti-friction rollers, having the ends of corresponding form, to substitute rolling for rubbing friction at the ends of the rollers—as it is well known that in the use of anti-friction rollers in the boxes of carriages and other axles much friction in guiding the rollers, when made square or round as heretofore, has been unavoidable; but by this arrangement rubbing friction is entirely avoided, and rolling friction substituted therefor; and hence much jar may be avoided by keeping the flanches close up to the ends of the rollers."

"By thus bevelling the ends of the rollers, and the shoulders on the axle and box, it will be obvious that where the bodies come together, in avoiding end play, the rubbing friction heretofore experienced is avoided, and rolling friction substituted therefor.

"I do not claim as my invention the employment of a series of rollers, connected by rings at each end around an axle, and within the box, as this has long since been done; but what I do claim as my invention, and desire to secure by letters patent, is making the ends of such rollers on a bevel or mitre, in combination with shoulders, collars, flanches, rings, or other projections on the axle and on the box or hub, having corresponding bevels or mitres to avoid the rubbing friction at the ends of the rollers, and the more effectually to prevent end play, substantially as herein described."—*Burke's Report, page* 73.

RAIL ROADS.

Four patents were granted during the year 1845, for improvements in rail roads; two of these, are extensions of well known patents. The other two do not present striking novelties, but nevertheless the inventions appear worthy of attention. The objects at which the inventors seem to have aimed are permanence and simplicity. The following extracts from one of these patents will sufficiently set forth the nature of the improvement:

"I do not use either string-pieces or cross-ties of wood or stone, but I make them of iron. The lower portion of the string-piece, which I will call the under rail, has a broad bearing upon the road bed, and I connect them together laterally and longitudinally by means of iron cross-ties and chairs formed in one solid piece.

"The base of the under rails may be made ten or twelve inches wide, and three-fourths of an inch thick. The stem which rises from the middle of the base may be seven inches high, and three-fourths of an inch in thickness. The top of the stem is enlarged where it is to receive and embrace the top rail. Along this enlargement of the top of the stem a groove or channel is formed, which is to receive, first a strip of hard wood, kyanized, or other elastic substance, and upon this is placed the top rail. The strip of wood may be about an inch thick, and the channel should be about an inch and a half deep, so as to embrace the base of the upper rail to the depth of about half an inch. The width of the channel should be about 14 inches and a half, or of such width as may be rendered necessary by that of the top rail."

"Having thus fully described the nature of my improvement, and shown the manner of carrying the same into operation, what I desire to secure by letters patent is, the use of the continuous strip of wood, or other elastic substance, combined with the under rails, as described herein, and with the wrought or cast iron top rail, of the plate, or bridge, or any other form substantially in the manner set forth.

"I also claim the manner of connecting and holding together the upper and under rails of iron, as herein described, so as to make the under rail serve as a *chair throughout its whole length* to the top rail, (the latter being imbedded in a channel in the former,) or, as in the other described plan, where the top rail is grooved on the under side, and rests on the under rail as a saddle, thereby giving strength and stability to the joints of both the upper and under rails.

"I claim the use of cast iron top rails, when in connexion with iron under rails."—*Ib, page* 71.

ATMOSPHERIC RAILWAY.

An extended notice, together with suitable illustrations of this system of Railway will be given in a future number of the Mirror.

RAIL ROAD CARS.

Nine patents have been granted within the year for improvements connected with locomotives and rail road cars. Some of them could not be fully understood without drawings. They are for improvements in hanging car bodies so as the better to equalize the weight upon the wheels, and to give greater ease of motion; for an improved connecting link; for replacing cars which have been thrown off the track; for improvements in car wheels; for removing trucks by the use of a drop platform, and for a mode of connecting the wheels of locomotives, so that they shall operate as driving wheels.—*Ib, page* 73.

NOTICES OF NEW RAIL ROAD INVENTIONS, &c.

Mr. JOHN H. LILLIE, of Pittsburgh, has invented a machine which he believes he has so far perfected as almost to demonstrate the practicability of using the electric fluid as a motive power. He thinks he has discovered a practical principle whereby he can use this mysterious, subtle and powerful element to propel machinery, boats, railway trains, &c. The machine is styled by Mr. L. the "Electro Magnetic Engine." The Pittsburgh Gazette, speaking of the invention, says—

Mr. Lillie informs us that he is now building a large and splendid model machine, of which the Fly or balance, will weigh eight pounds.—We were favored by him with an examination of a small machine while running. With a small battery it worked to admiration, running very fast. The question is whether it can be made applicable in practice on an extensive scale? This is to be solved by further experiments.

We are met with a usual difficulty in attempting to convey an idea of a new invention without the aid of cuts or a familiar acquaintance with technical terms. The insuperable obstacle in perfecting all such machines, has been to gain "stroke." The motion communicated by the Piston of a steam engine to the 'Fly' Wheel is 'stroke.' We say of a Steam Engine, it is 2, 4 or 6 feet stroke. In this machine this appears to be accomplished. The magnets are arranged in tiers ascending from the centre. A rack, working on a Central Axle, supports strips of Iron over

the Magnets. To illustrate the operation, imagine one of our Fire Engines at work. The power is by weight alternately applied to levers at each end of the arms. Suppose instead of levers, there were pieces of iron of broad surface, and a number of very large and powerful magnets arranged under each end. When in operation, the Positive and Negative Poles of the Magnets would alternately attract and repel, and the motion would be the same—precisely like men working it. Here is the power attained.

From the Axle, to which the arms of the Rack are securely fastened, an arm extends downward, and a shaft from the end of that to the end of a crank on the Fly or balance wheel, communicate motion to machinery, just as the Steam Engine from the end of the Piston Rod, working on slides. The machinery of Mr. Lillie's is as simple as can be imagined.

It is obvious that if this Engine is ever made applicable to mechanical purposes, it must revolutionize all motive power, except, perhaps, water. There is no waste or loss in its application.—It can be started and stopped in a moment. The instant it is stopped all expense ceases. The fuel is simply metal and acids, and the expense for these, from recent discoveries, is reduced to a comparatively small cost. There are many other advantages which we need not enumerate. Of one thing every person who sees it will be satisfied—there is no deception about it. It is understood at a glance. The question of its practical use is yet to be settled. Mr. L. informs us that the small model has power sufficient for a Watch-maker's Lathe. He has lodged a *caveat* in the Patent Office to secure his invention.

FOREIGN INVENTIONS.

NEW LOCOMOTIVE MECHANISM.

A working model of a new plan of railway locomotion has been exhibited in London with a view, as stated, to the adoption of means for securing the great objects at which railway enterprise aims, namely, safety to human life, certainty of action, and economy in construction and working. By the new plan, the carriages are proposed to be built upon platforms which will glide on the peripheries of parallel lines of wheels, mounted on chains, stanchions or piles, rendering rails and bridges unnecessary. An immoveable rope or chain forms a fulcrum, against which the motive power is to be applied. The rope or chain passes round a drum fixed on a travelling platform, the drum being set in motion by a small engine fixed on either side of it, on the platform, underneath which ribs or flanges, about a foot in depth make it difficult, if not impossible, for it to get off the wheels. The line of traction being invariable in the middle of the road, it is contended that no probable cause of accident can occur to disturb it, and that it will avoid the great danger incident to railways from the breaking of an axle, a wheel, or a rail, or from a short curve. An experimental road, of about a mile in length, is to be constructed near the Metropolis.

NEW LOCOMOTIVE.

A patent is taken out for an engine on a novel principle by one Stephenson. It is well known that the outside cylinders, by their alternate action, cause a wriggling motion at high velocities. To obviate this, Mr. Stephenson has three cylinders, two outside, and one in the middle. The two outside are smaller cylinders and work together. The middle one works a crank at right angles to the beam of the others, and is large enough to equal the two. This will cause the boiler to be somewhat raised, to admit the working of the crank on the middle of the axle; but the contrivance, we feel persuaded, will fully cure the unpleasant wriggle in outside cylinder engines.—*Dublin Nation.*

NEW PROPELLING POWER.

Mr. R. Mushet of Coleford, concludes a letter to the Mining Journal, as follows:—"Why not employ the force of a large steel spring similar to the spring of a watch, to put in motion a Railway train? The spring might from time to time, be wound up by the power of small stationary steam engines; and as watches will go for twenty-tour hours, without winding up, why should not a locomotive, furnished with a similar source of power within itself, go for an equal space of time? Those who have seen and understand the construction of common musical boxes, will readily comprehend how the force of a spring may be made to communicate to the driving wheels of a locomotive any required degree of velocity; the fly wheel or fan of the box, revolving at a rate far greater than would ever be required in railway locomotion.—*Ib.*

LEGAL DECISION.

LIABILITY OF RAILROAD COMPANIES FOR LOST BAGGAGE.

The following case was decided in Philadelphia, before Judge Rogers.

Joseph Levinson vs. The Philadelphia and Trenton Rail Road Company.—On the 2d of June, 1845, the plaintiff took passage in the seven o'clock line from this city to Trenton. He had with him a valise, which was placed in the baggage crate, and a numbered check was handed to him, as is customary. The valise contained some clothing belonging to the plaintiff, and a quantity of jewelry, worth a considerable amount. Upon his arrival at Trenton the valise could not be found, and the plaintiff went on with the train to New York, in the hope of recovering its possession, either at the end of the journey or the intermediate stopping places.

It was not found with the baggage when the crates were opened at New York; but it was found the same day among some baggage left at Newark, and was forwarded in the mail crate to Jersey city; from there the crate was taken to New York, and was left standing upon the wharf all night. The next morning when the crate was opened, the valise was found to be rifled of the jewelry, but the clothing remained. It was offered with the clothing to the plaintiff, who refused to accept it, and brought this action to recover damages for the loss sustained by him.

The Company proved that the line upon which the defendant had engaged passage, was a *passenger line* only, and did not carry freight: that notice was given that they carried only passengers and baggage: and they contended that the jewelry which belonged to plaintiff was not baggage, but freight, and that they were not liable for its loss.

The Judge charged the jury that this action could not be maintained. The company had only engaged to carry passengers and baggage—they had tendered him his valise

and clothing; the articles of jewelry were not baggage, but come under the denomination of freight. The plaintiff was bound to inform them that he had freight in his valise, and pay them for the transportation of such freight. The defendants could not be made liable for valuable articles stowed away among the baggage of which they were entirely ignorant. Verdict for the defendants.

For the Mirror of the Patent Office.

A NEW APPLICATION FOR AN OLD PURPOSE.

PACKING FOR STEAM JOINTS.

The writer of this has proven by actual experiment and continued use, for over six months last past, that *Goodyear's Patent Metallic Rubber* forms a superior packing for steam joints, and is of opinion that it is quite as cheap in the long run as the old materials in use.

The first experiment was on a joint of a small steam pipe. A thin sheet—say 1-12 of an inch thick—of metallic rubber was applied in the usual way of using sheet lead. It made a good and perfectly tight joint. The second experiment was to the "man hole" of the steam boiler, and it succeeded to a charm; the thing did not leak a drop during four weeks continued use; and for this purpose I shall not think of using hemp again. On board steam vessels, the machinery of which is so liable to wrenching from the rolling of the sea, a very thick joint of this material would seem to be very desirable indeed. The pipes themselves might be formed so as to be both flexible and elastic enough to elongate, and yet be perfectly secure. A few feet of each long pipe could be conveniently prepared with this material to render slip joints unnecessary.

For valves, either for steam, air, or water, this substance is applicable, and far superior to leather, in ordinary valves; while a proper application of this would make safety valves perfectly tight.

D.

LIST OF PATENTS FOR FEBRUARY AND MARCH, 1846.

Improvement in CANDLE MOULDING, by JOHN DRUMMOND, of New York, Patented, February 20, 1846.

Claim—The method of making Candles by forcing the tallow or other suitable material through a moulding tube; when this is combined with a small tube within it, through which the wicking is introduced, to cause the tallow to unite around the wicking.

Improvement in COOKING STOVES, by RENSSELEAR D. GRANGER, of Albany, Patented, February 20, 1846.

Claim—The draught-tube for admitting air to the fire passing through the flue, by which the air admitted is heated before it reaches the fire.

Improvement in Machines for GRINDING and FODDER CUTTING, by JONATHAN JESSOP, JOHN WANBAUGH, GEORGE W. ILGENFRITY, A. JAMES, C. BAKER, of York, Pennsylvnia, Patented, Feb'y 20, 1846.

Claim—The arrangement of the hopper back of the main grinding cylinder in a combined machine for cutting and grinding fodder, so arranged as to cause the main grinding cylinder to take the fodder from the hopper, into which it is discharged by the cutters, and carry it around to be ground or crushed between the two.

Improvement in CHIMNEY CAPS, by MOSES CHASE, of Boston, Massachusetts, Patented, March 7th, 1846.

Claim—A horizontal turning top having a descending flue or tube, for the introduction of fresh air, opening from the windward end of said horizontal turning top, and passing down through the discharging flue or tube, and below the bottom of the same.

Improvement in SAW MILLS, by GEORGE SWEENEY, of Bucyrus, Ohio, Patented, March 7, 1846.

Claim—The mode of setting the head end of the log, when the same is in the groove of the block-head, by the aforesaid combination and arrangement of the inclined beam or post containing the fulcrum of the lever and the levers, and the connecting rods, and the trip block, by which the log is raised from the head block and moved sideways of the distance required.

Improvement in COOKING STOVES, by RENNSELEAR D. GRANGER, of New York, Patented, March 7, 1846.

I claim the *curved* flues in the rear of the lower oven, herein shown, serving to throw the heat somewhat backwards upon the bottom plate of the upper oven.

Improvement in SAW MILLS, by RUSSEL S. MORRISON and B. B. CUSHING, of Frankfort, Maine, Patented, March 7, 1846.

Claim—The combination of the two carriages and sustaining rollers, or their mechanical equivalents, with one or more saws, &c.; the whole being arranged and operate substantially, and in the combination with the saws and carriages of one or more series of circular or other proper shaped revolving guide plates, the same being for the purpose of preserving the boards or sawed sections of the log in their verticular or true positions.

Improvement in PISTONS for Pumps, Engines, &c., by DAVID KINMAN, of Brunswick, Ohio, Patented, March 7, 1846.

Claim—Composing a piston of three or more segments rolling on each other as they vibrate together, each on a separate axis along or near to their outside edge.

Improvement in HATCHES for Vessels, by R. C. HOLMES of Cape May, New Jersey, Patented, March 7, 1846.

Claim—The method herein described of preventing the hatchways of vessels from leaking by making a groove or gutter in the framing on which the hatch or cover rests, with apertures or tubes leading therefrom to the outside of the framing in combination with the valves governing these apertures, and opening outwards to prevent the escape or discharge of water from the groove or gutter, and prevent water from washing in.

Improvement in THRASHING MACHINES, by PLINY WELLER, of Fowlersville, New York, Patented, March 7, 1846.

Claim—By combining two rolling screens with the two endless aprons so as to effect the separation and clearing of the grain.

Improvement in FILTERS, by WILLIAM H. JENNISON, of New York, Patented, March 7, 1846.

Claim—In forming a filtering medium, for filtering water and other liquids, of sponge, compressed under a sufficient pressure to prevent sediment from entering the pores thereof, and permit pure water, under pressure, to pass through.

Improvement in the Manufacture of SOAP, by D. FRICK ALBERT, of Manchester, England, Patented, March 7, 1846.

Claim—The invention is the saponization of animal's entrails or butcher's offals by means of a strong caustic alkali.

Improvement in REAPING MACHINES, by WILLIAM F. KETCHUM, of Buffalo, New York, Patented, March 7, 1846.

Claim—The manner of constructing the rack teeth; the same consisting of two plates of unequal length, and each set being made separate, and not as a whole plate as heretofore. I claim further, the arrangements of having the operating part, as the driving wheels under the platform on which the cut grain falls using one or more revolving sharp edge shafts for the purpose of carrying the cut grain from the knife blade to the platform.

Improvement in MORTISE LATCHES for doors, by R. KINSLEY, of Springfield, Massachusetts, Patented, March 7, 1846.

Claim—The form of the case of Mortise Latches by the union of the circles, one large in the middle and a small one on each side, the three intersecting each other substantially, as to leave greater strength in the wood of the door on each side, and to admit of fitting into the door by boring simply. I also claim locating the helical spring in a recess in the body of the latter bolt, in combination with the mode of preventing friction and wear, by sustaining one end on a flanch or plate of the bolt, and a shoulder on the standard.

Improvement in DOOR LOCKS, by JOHN H. DAVIS of Lumberville, Pennsylvania, Patented, March 7, 1846.

Claim—The combination of the revolving escutcheons and wheel with the bolt and panel, in the manner described, so that when the bolt is locked and the key hole closed, the lock is perfectly protected from attempts outside, and when drawn back it can be locked equally well from either side.

Improvement in the Manufacture of SOAP, by JACOB KEEN VAUGHN, E. H. EVERMAN, of Philadelphia, Pa., Patented, March 7, 1846.

Claim—The application and addition, to a given quantity of Soap, of water, borax, salt, glue, and palm oil, which will increase the quantity and improve the quality of the Soap used.

Improvement in SEED PLANTERS, by JAMES PUTNAM, of Hamilton, New York, Patented, March 7, 1846.

Claim—By combining of the lateral rakes, with the furrower, for the purpose of preventing the coverer from drawing in stones or other hard substances over the seeds.

Improvement in PERMUTATION LOCKS, by FRANCIS B. PYE, of New York, Patented, March 7, 1846.

Claim—The manner set forth of arranging and combining with the key levers, the immediate levers, the auxillary levers, and the bolt levers, which are raised and lowered by said auxiliary levers. The whole of them having fulcrumpins, on which they rise and fall, and not operating as slides in a direct line by which arrangement they are rendered more certain in their actions.

Improvement for FASTENINGS for Doors, by AMOS BALL, Springfield, Massachusetts, Patented, March 7, 1846.

Claim—In connecting the knob of a latch with the spindle in such a way, as that it can be made to turn either with or without the spindle, by means of a bolt acted on the opposite side of the door, to control the action of said knob.

Improvement in REAPING MACHINES, by J. DARLING, of Adrian, Michigan, Patented, March 7, 1846.

Claim—The carrying or gathering platforms, formed of slats with pointed teeth thereon with the cutting and thrashing apparatus, and also the mode of steering by pivot wheels, in combination with the reaping apparatus.

Improvement in PUMPS for raising and measuring Liquids, by DANIEL HUNSICKER, of Hartleton, Pennsylvania, Patented, March 7, 1846.

Claim—I make no claim to the Pump, but only to the combination of the additional apparatus with it, by which it is adapted to the drawing of molasses, oil, and other articles, in any required measure, by atmospheric pressure and lever power.

Improvement in HYDRANTS, by FREDERICK H. BARTHOLOMEW, of New York, Patented, March 7, 1846.

Claim—The combination of the plunger with the piston or valve cock. Also, the combination of the plunger and piston with the hydrant, said combination effecting the double purpose of checking the concussion from the water, and of furnishing a valuable chamber in which the waste water may descend away from the influence of frost, and not waste away into the ground.

Improvement in FEEDERS for Screw Machines, by SOLYMAN MERRICK, of Springfield, Massachusetts, Patented, March 7, 1846.

Claim—The combination of the conical hopper, one or two or more conic frustra, a partition, and a delivery apparatus, arranged and operating together; also, the combination or the revolving beater with the conic hopper, and one or more frustra, or other mechanical equivalents; the whole being disposed and operating together.

Improvement in the Manufacture of ROSIN and SPIRITS of TURPENTINE, by N. U. CHAFEC, of Charleston, S. Carolina, Patented, March 14, 1846.

Claim—By manufacturing of white Rosin and white Spirits of Turpentine from the gum of pines, either dip or scrape, by the application of steam, generated from water in a common boiler or still, and conducted through wood or metal pipes into a wood or metal still, mixing with the gum, and then passing through a metal heater.

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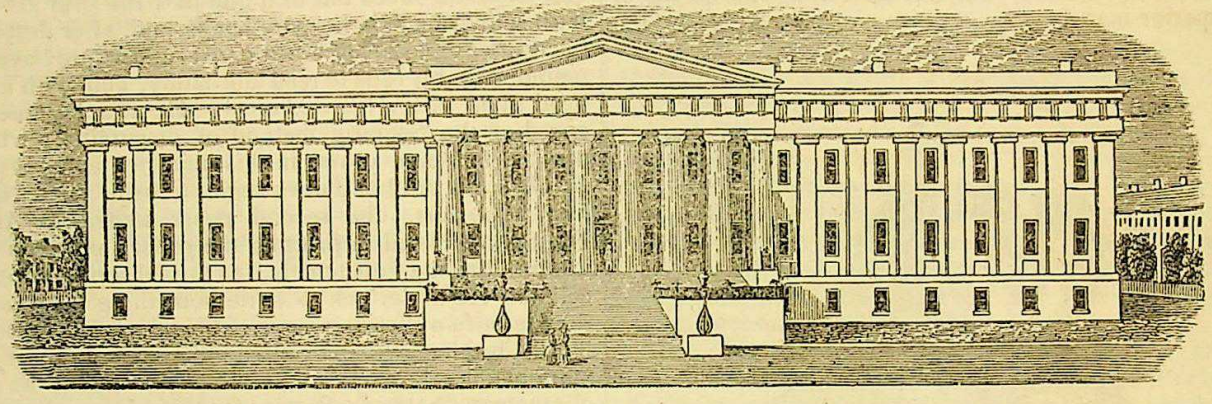


PATENT OFFICE.

(For the Mirror of the Patent Office.)

BIOGRAPHICAL SKETCHES.

BENJAMIN FRANKLIN.

BY THOMAS G. SPEAR.

THERE are few who have not made themselves acquainted with the life and character of Benjamin Franklin. Intimately connected as he is with the early History of the American Government, being one of the founders and establishers of our present republican system, and a father of the nation, and occupying at one time a position abroad which commanded the attention of Europe and the world, no student of political history, or one at all conversant with the events of the last century, can be expected to be otherwise than familiar with his many public services and achievements—with his strong patriotism, his high responsibilities, his enlarged and comprehensive principles, his philanthropic views, and his great political sagacity and foresight, which never, while standing close by the interests of his country, forgot what was due to mankind. But it is not alone as a politician and statesman, that we delight to consult the life and contemplate the character of Franklin. As a lover of liberty and a servant of his race, he secures our profoundest gratitude and esteem; but as a man of science and a philosopher it is that he challenges our highest admiration. His is a two-fold glory—that of being an apostle and successful maintainer of independence and human rights, a devoted student of the moral and physical economy of the world, and the revealer and establisher of some of the most intricate laws of nature. And his greatness was of his own achieving. His character, under Providence, whose smiles he delighted to acknowledge, was self-constituted. His excellencies were not borrowed, but intrinsic, and the consequence of an apt mind perseveringly engaged in the pursuit of truth and human good. His life has proved that the attainment of moral and intellectual excellence is the most exalted aim of man,—and in that proportion to the assiduity of his labors in the field of his duty shall be his reward. Franklin's name, as known in history, was entirely the result of application in the cultivation and use of good natural parts. He was the architect of his own fortune—the author and finisher of his own fame. His talents were not dazzling, yet great—his temperament was buoyant and ardent—his habits practical—his manners agreeable, and his life one of untiring exertion and acquisition. He made room for himself in the world by a proper use of the time allotted him, and of the faculties with which he was endowed. Every mechanic has a chance to do the same. The avenue is open to all. Let there be more to walk therein, and do their best, as he did, though they come short of as great a reputation as his age accorded him, and which posterity will not seek to distrust or willingly impair. There can be no danger in following his example. It can lead to no evil. "Useful as I was, be thou not useless—great as I may be thought, be thou not devoid of assiduity in thy calling, or of self-denial in thy ambition," is the great moral which his life teaches. He sought not his own advantage at the cost of others, and by attention to small proprieties found himself the compeer of the most illustrious, and the commander of the confidence of

the most scrutinizing. A few were intimate with him, esteemed and admired him—millions heard of his services and his researches, and applauded him. Their welfare was his object,—their approbation and his own self-approval, his highest consolation. He studied the works of God, and the sublimest truths followed his conceptions and experiments. He saw the evils which set a people at variance with their rulers, and in applying the remedy, he brought on a glorious Revolution, and sustained it till a Nation was born. And when all the patriotic schemes were accomplished for which he had lived, and he was at the height of his renown, he piously "acknowledged his grateful sense of the many blessings he had received from the Supreme Being, who had raised him from small and low beginnings, to such high rank and consideration among men."

Let us devote ourselves to a short account of the life of this superior man.*

Benjamin Franklin was born in Boston, Massachusetts, January 17, 1706, at a house in Milk street, opposite the Old South Church, but his father removed shortly afterwards to the corner of Hanover and Union streets, where Benjamin passed his early years. Being intended for the Church, he was put to the grammar school, at 8 years of age, where he remained, however, but one year, his father, burdened as he was with a large family of 17 children, finding it inconvenient to meet the expense of a college education for this his youngest son, he put him to another school where writing and arithmetic were taught. "There," says Benjamin, "I learned to write a good hand pretty soon, but failed entirely in arithmetic." At 10 years old he was taken away to help his father in his business, which was that of a tallow chandler and soap-boiler. He disliked this trade, and had a strong inclination to go to sea, which his father opposed; but finding him much addicted to reading and fond of books, and having an elder son, James, in the printing business, he put him an apprentice to this elder brother at 12 years of age. This trade he liked better, and to satisfy his love of reading, borrowed books, which he was careful, he says, to return soon and clean. "Often I sat up in my chamber reading the greatest part of the night, when the book was borrowed in the evening and to be returned in the morning." He now began to take a strong inclination to poetry, and wrote some little pieces, such as ballads, songs, &c., which his brother encouraged, and, when printed, sent him about the town with them to sell. The first sold prodigiously, the event being recent; but his father's criticisms and advice, turned him to practise in prose, which became a means of his future advancement. He took now to a vegetable diet, and told his brother if he would give him half the money he paid weekly for his board, he would board himself. This was assented to, and Franklin saved out of it one half the sum given him, with which he bought more books, and, after despatching his dinner of a slice of bread or biscuit, would have the remainder of his time to read and study, and with a clearer head than with a heavier meal. He now became enamoured of the Socratic method of disputation, which he adopted for some years, in his inquiries and arguments. In 1721, his brother James began to print the *New England Courant*, the second paper issued in America. Benjamin assisted in printing the paper, and then carried it around to the "customers," as the subscribers were then called. He undertook to write something for it, and had the pleasure of hearing some of his articles commented on by his brother and his contributors, and receiving their approbation, they naming, in their guesses at the author, characters known in Boston for their learning and ingenuity, not dreaming that the real writer was a boy, and one who put their own articles in type, and served the paper after it was printed. One of these pieces gave offence to the Assembly, for which James was imprisoned, and the paper afterwards printed in the name of Benjamin Franklin. He differed with his brother, and an open rupture finally taking place, he left him, and went to New York, and subsequently to Philadelphia, where he arrived October, 1723, at the age of seventeen, landing at 9 o'clock on Sunday morning, at Market street Wharf. He was in his working dress, and had his pockets stuffed out with shirts and stockings, with only a single dollar and a copper shilling, fatigued and hungry, and knowing no one. He met a boy with bread, of whom he bought three penny worth, (three great puffy rolls,) when he walked off up the street with a roll under each arm, and one in his hand, eating, until as far as Fourth street, opposite the door of a Mr. Read, his future wife's father. Miss Read was standing at the door at the time, and thought he made a most awkward and ridiculous appearance. His rambles brought him back to the boat, where he gave the remainder of his rolls away. Being thus refreshed, he walked up the street again, and got into a Quaker meeting house, where nothing being said, he fell asleep, but was kindly waked when the congregation separated. He found employment the next week with one Keimer, a printer, for whom he printed, and at the same time took lodging at Mr. Read's before mentioned; and, when his chest of clothes arrived, made rather a more respectable appearance in the eyes of Miss Read. His proficiency in his art soon gained him the attention of the then proprietary governor of Pennsylvania, Keith, who solicited him to establish a printing office of his own. He returned to

*Jared Sparks's "Life of Franklin" will be principally consulted in this Memoir.

Boston to get his father's consent and assistance, who would give him neither, considering his son yet too young to begin for himself. He returned again to Philadelphia, and continued profitably employed at his business, and to cultivate his mind in company with several other young men of similar age, until induced by the representations of Gov Keith to depart for London, with a view to purchase the materials necessary to establish a new printing office under his own control in the city of his adoption. Arrived in London, he discovered, when too late, that he had been trifled with by his pretended patron, and his plans frustrated. Here his funds were exhausted, and he took to working at his business as a pressman, and then as compositor, undergoing little characteristic adventures which we have not room here to relate, and in about 18 months returned again to Philadelphia with a friend, Mr. Denham, as Merchant's Clerk, expecting his connection with printing was at an end forever; but in this he was mistaken,—for Mr. Denham soon dying, he resorted to his old trade again in Philadelphia. Here he saw Keith, who was no longer governor, and evaded all interviews with Franklin, being doubtless ashamed of his conduct towards him. He also saw Miss Read, who had, in his absence, married indifferently, but soon discarded her worthless husband. He went to work for Keimer again, but subsequently withdrew from his employment on account of an affront, and started business with a partner, named Meredith. He shortly after began a newspaper, and his partnership with Meredith was dissolved, he being "no compositer, no pressman, and seldom sober." His paper succeeded, sustained by his frugal habits, industry and talents, and became the best at the time in the province. His attention was now turned to matrimony, and a long acquaintance and courtship, led him, after due consideration, to the marriage of Miss Read, the young lady who witnessed his appearance with the rolls of bread under each arm, on his arrival in Philadelphia. She proved a good and faithful helpmate. They throve together, and ever mutually endeavored to make each other happy. He now set on foot his plan of public subscription libraries; and founded a Library in Philadelphia, now in existence, and considered to be one of the largest in the world, and the mother, says Franklin, speaking of it himself, "of all the North American subscription libraries now so numerous."

Franklin's next arduous project was to arrive at *moral perfection;* or, in other words, to conquer himself. He accordingly proposed to himself the observance of the following thirteen virtues, with the precepts annexed.

1. *Temperance.*—Eat not to dulness; drink not to elevation.

2. *Silence.*—Speak not but what may benefit others or yourself; avoid trifling conversation

3. *Order.*—Let all your things have their places; let each part of your business have its time.

4. *Resolution.*—Resolve to perform what you ought; perform without fail what you resolve.

5. *Frugality.*—Make no expense but to do good to others or yourself; that is, waste nothing.

6. *Industry.*—Lose no time; be always employed in something useful; cut off all unnecessary actions.

7. *Sincerity.*—Use no hurtful deceit; think innocently and justly; and, if you speak, speak accordingly.

8. *Justice.*—Wrong none by doing injuries, or omitting the benefits that are your duty.

9. *Moderation.*—Avoid extremes, forbear resenting injuries so much as you think they deserve.

10. *Cleanliness.*—Tolerate no uncleanliness in body, clothes, or habitation.

11. *Tranquillity.*—Be not disturbed at trifles, or at accidents common or unavoidable.

12. *Chastity.*

13. *Humility.*—Imitate Jesus and Socrates.

He fixed his attention on one of these at a time, and when he had tolerably well mastered that, proceeded to another; and so on till he had gone through the whole, which were then repeated. He was surprised, he says, to find himself so much fuller of faults than he had imagined; but he had the satisfaction of seeing them diminish. To the joint influence of the whole mass of the virtues, by this little plan, he ascribed all his evenness of temper and the constant felicity of his life. His list of virtues contained at first but twelve, but a Quaker friend having informed him that pride showed itself too obviously in his conduct, he added *Humility* to the list, giving an extensive meaning to the word. In this connection he projected the scheme of a "Society for extending the Influence of Virtue," which was received by a few with enthusiasm. This was an undertaking of magnitude, yet seems to have had no discouragements for him, but his multifarious occupations, and the necessity of sticking close to his business, prevented his prosecution of it to the success which he thought was practicable by undivided attention.

In 1732, he first published *Poor Richard's Almanac*, which met with great success and wonderful celebrity, for the wise and well-worded maxims which it contained.

After ten years absence from Boston, he made a journey thither to visit his relations, which he could not sooner afford. In returning, he called at Newport, R. I., where he saw his brother James, settled there as a printer. Their meeting was cordial and affectionate, former differences being forgotten. James was then in declining health, and Benjamin promised to take his son, then about ten years of age, and bring him up to the printing business, which promise he faithfully performed after his brother's decease, first giving the boy an education.

Franklin having began now to give his attention to public affairs, in 1736, he was chosen Clerk of the General Assembly of Pennsylvania without opposition, and in 1737, received the commission of Deputy Post-Master at Philadelphia, and soon after projected and saw established the first fire company known in Philadelphia, of which he was long an active member. In 1744, he succeeded in establishing the *Philosophical Society*. In 1741, he had commenced the *General Magazine*, which, after six monthly numbers, was relinquished. He was very active and influential in obtaining means, and raising soldiers, to act on the defensive in the old French and Spanish wars, and did not withhold his services as a soldier or a civilian when demanded. But peace following, he turned his thoughts to the establishment of an Academy for the education of Youth in Pennsylvania, for which he afterwards obtained contributions abroad, and had the happiness to see it in a prospering way, many through it receiving excellent educations and becoming ornaments to their country. This is understood to be the origin of the present University of Pennsylvania, at Philadelphia.

Franklin had now acquired a sufficient though moder-

ate fortune, and flattered himself with the possession of the rest of his life for philosophical pursuits, and purchased an apparatus to prosecute his electrical experiments, having taken Mr. David Hall, as a partner in the printing office, who accounted to him punctually for the business and his share of the profits. But the civil authorities considering him a man of leisure, began to impose new duties upon him. The governor made him a justice of the peace; the corporation of Philadelphia chose him one of the Common Council, and soon after an Alderman, and the citizens at large elected him a burgess to represent them in the Assembly. The year following, he was one of the Commissioners for making a treaty with the Indians at Carlisle, which was concluded in a manner mutually satisfactory. In 1751, he was mainly instrumental in establishing the *Philadelphia Hospital*, for which he obtained the charter, raised and contributed funds, and of which he was elected a manager. He also exerted his influence successfully for publicly lighting the streets of Philadelphia at night. In conjunction with Mr. John Hunter, he regulated for four years the officers of post offices, till, from being a burden to the British crown, it became a source of revenue; but from which, subsequently, from a freak of Ministers, he was removed, after which authoritative transaction, they received from it—just nothing!

In 1754 the Colonists were apprehensive of a new French war, and the Commissioners from the different colonies assembling at Albany, and he being one, on his way thither, he drew up a plan for the union of all the colonies under one government, for defence, and other general purposes. It was laid before the Congress of Commissioners, and preferred over several others. This plan, however, was never carried into effect, being considered, when referred to the Assemblies for their concurrent action, as having too much *prerogative* in it, and by the British Government as being too *democratic*. So the subsequent pretext for taxing America, and the bloody contest it occasioned, was not avoided when it might have been by more foresight in the actors upon Franklin's project.

When war was commenced by France, the government of Massachusetts Bay designed an attack on Crown Point, and sent deputies to Pennsylvania, to solicit pecuniary assistance, which Franklin exerted himself to obtain from the Assembly, and with success. When Braddock arrived with his army to prosecute the war at the west, he had great difficulty in finding means by which to transmit his troops and ammunition with the necessary provisions for the troops. These Franklin obviated by assuming heavy personal responsibilities, and the General prosecuted his march to Fort Duquesne. Too confident of success, and indifferent to Franklin's instructions, Braddock was defeated, with great slaughter, and the loss of his stores, and the wagons, &c., Franklin had risked his all to secure. Though much harrassed by the claimants, he was eventually released from payments which to make would have ruined him, and for which he was under bond. Franklin about this time interested himself in carrying into effect a benevolent plan for improving the condition of the German population in America.

He was now appointed one of the commissioners for appropriating the public money for military defences, and proposed a new Militia law, which passed the Assembly. Being commissioned to take charge of the frontier, he took up his march at the head of a body of troops, and raised several stockades near Gnadenhutten for protection from the Indians, when he returned to Philadelphia, where he was chosen colonel of a regiment, and took a journey to Virginia, declining the Governor's proposal to lead an expedition against Fort Duquesne.

Having seen some experiments in electricity in 1746, in Boston, Franklin continued to practise upon them afterwards, making various improvements in his machinery, and testing the laws of the subtle fluid, until by means of a kite and the strings attached, under a thunder cloud, he proved electricity and lightning to be the same, and suggested the means of partial security against its fatal effects in the lightning rods in use at the present day. This discovery of Franklin's obtained him the attention of the philosophical and scientific world. He was chosen a member of the Royal Society in London, without fee, by which he was also presented with Copley's gold medal for 1753, accompanied by a handsome speech by the President, in which he was highly honored. Other marks of distinction followed, both at home and abroad, where he was ranked with Boyle and Newton for his scientific labours, and wonderful discoveries. Speaking of Franklin's Philosophical writing, Sir Humphrey Davy has observed, that "A singular felicity of induction guided all his researches, and by very small means he established very grand truths. The style and manner of his publication on electricity, are almost as worthy of admiration as the doctrine it contains. He has endeavored to remove all mystery and obscurity from the subject. He has written equally for the uninitiated and the philosopher, and he has rendered his details amusing as well as perspicuous, elegant as well as simple. Science appears in his language in a dress wonderfully decorous, the best adapted to display her native loveliness. He has, in no instance, exhibited that false dignity, by which philosophy is kept aloof from common application; and he has sought rather to make her a useful inmate and servant in the common habitation of man, than to preserve her merely as an object of admiration in temples and palaces." In consideration of his improvements in the electric branch of Natural Philosophy, he was, in 1753, presented with the degree of Master of Arts by Cambridge College. Yale College paid him a similar compliment. Thus, without studying in any college, he came to partake of their honours.

The differences between the proprietary governors and the Assemblies continuing, Franklin became an active participant, and, in fact, the prominent leader on the popular side in Pennsylvania; and was deputed by his colleagues to present a petition to the king, and to act in England as an agent for the Colony. After provoking delays in New York, and a voyage perilous near its close, he arrived in England, and entered London, July 27, 1757.

After recovering from a severe spell of illness of six weeks duration, he entered upon his business. He saw the proprietaries, who were unwilling to yield anything to the complaints of the people, and for nearly a year scarcely any progress was made. His fame as a philosopher and as a political writer had preceded him in England, and he was consequently treated there with deserved consideration, and received the congratulations of some of the savans of Europe. He spent part of his leisure seeking out facts and traditions concerning his family, and

saw some of his collateral relations. He also entered warmly into the politics of the nation, and advised the conquest of Canada in the War with France; and the victory of Wolfe at Quebec, and its consequences, may chiefly be ascribed to Franklin's intimations to the Ministry. He was also, subsequently, highly instrumental in the annexation of Canada to the British dominions.

He made a journey to Edinburg, where he had some time before been honored with the degree of Doctor of Laws. Speaking of his intimacy there with Hume, Robertson, and Lord Kaimes, he says, he spent in Scotland "six weeks of the *dearest* happiness of any part of his life." In the summer of 1761, he travelled through Holland and Flanders, but returned in time to witness the coronation of George the Third. He still continued his philosophical studies profitably, and invented a musical instrument called the *Armonica*, suggested by the musical glasses. After residing in England above five years, he sailed again for Philadelphia, where he arrived on the 1st of November, 1762, when he received the thanks of the Assembly, for the faithful discharge of his mission, and after taking a short tour through the middle and eastern colonies, engaged again in public affairs. He was appointed one of the commissioners to expend funds raised for defences against the incursions of the Indians, on the frontiers, who had formed themselves into a confederacy of war upon the whites. In retaliation, some of the infuriated populace attacked and massacred a small tribe of peaceable Indians in Lancaster County, against which Franklin raised his voice and pen in indignant rebuke; and when a remnant of the aborigines sought refuge in Philadelphia, and were pursued by the armed insurgents of Lancaster, he met them at Germantown, and dissuaded them from their murderous purpose. His duties as commissioner, during the war with the Indians, were arduous, and faithfully performed; and from Colonel Bouquet, the commander of the Pennsylvania army, he received a letter of gratitude, in which his eminent services were recapitulated in the most complimentary terms.

The disputes between the Assembly and proprietary Governors continuing, a crisis arrived in the proposal of the British Ministry to raise a revenue by Stamp duties in the Colonies, and an election in 1764 turned upon the question of a change of Government. Franklin was defeated in his election, but the Assembly, when it convened, to the surprise of the proprietary party, appointed Dr. Franklin as a special agent to proceed to the Court of Great Britain, and take charge of the petition for a change of government, and manage the general affairs of the province. The agitation in the house and the clamour out of doors, became extreme. Twelve days after his appointment, on the 7th of November, Franklin left Philadelphia, accompanied by a cavalcade of three hundred citizens, who attended him to Chester, where he disembarked once more for England. When arrived there, although but a special agent of Pennsylvania, circumstances soon led him to take an active and conspicuous part in the general affairs of the colonies. They were unanimous in remonstrating against the mode of taxation, and the Assembly of Pennsylvania, instructed Dr. Franklin to use his efforts to prevent the passage of the Stamp Act. It was passed notwithstanding, and the news of its passage produced a universal excitement in America. To procure its repeal was the next object of the colonists, who sent their petitions from all quarters to have them laid before Parliament, where the subject was discussed with great warmth; and, while the debates were in progress, Dr. Franklin was called before Parliament to be examined respecting the state of affairs in America. His answers were given without premeditation, or knowing beforehand the questions to be put. He bore himself with dignity, and replied to every interrogatory with promptness and propriety; and there is no event in this great man's life more creditable to his character, or more honorable to his fame. It is an endearing monument to his wisdom, firmness, sagacity, and patriotism.

The Stamp Act was finally repealed, but with a *Declaratory Act*, that "Parliament had a right to bind the Colonies in all cases whatsoever." Though the repeal quieted for a time all uneasiness, more protracted and arbitrary legislation followed, until an inquiry began to be made on both sides of the Atlantic into the principles by which the people of the two countries were bound together, and the reciprocal duties involved in this union. In 1766, Franklin had gone over to Germany, to spend some time at Pyrmont for the benefit of the waters, and during an absence from London of about eight weeks, he made some useful observations on canal boating in Holland. On his return he gave earnest attention to the new inquiry, sustaining his doctrine by arguments drawn from history, and from well established principles in the British and Colonial Constitutions, which he communicated freely to his friends in both countries. Governor Hutchinson of Massachusetts, complained that they produced an influence unfavorable to the Ministerial schemes. Some of his remarks at that period were eminently prophetic of the now but partially developed future of his native land.

In 1767, he visited Paris with letters of introduction to several eminent persons, from the French ambassador, who had been particularly civil to him of late. The reception he met with there, where his philosophical discoveries were better known and more highly estimated than in any other part of Europe, was in all respects gratifying to him. Scarcely had he returned to London when news arrived of commotions in Boston, in consequence of new revenue exactions, whereupon the people had in town meeting passed spirited resolutions recommending the encouragement of economy and domestic manufactures. The proceedings gave great offence to the Ministerial party, and Franklin, to calm the excitement, and to draw public attention to the true grounds of the controversy, wrote a paper, entitled *Causes of the American Discontents before* 1768. This was published in the London Chronicle, the editor taking considerable liberties with the manuscript, which caused Franklin to say, "He has drawn the teeth and pared the nails of my paper, so that it can neither scratch nor bite: it seems only to paw and mumble." It was, nevertheless, extremely well adapted to the occasion, and written with the author's peculiar felicity of style. The causes of the troubles are traced from their origin, and placed in full force before the reader's mind.

He published, also, about this time, a piece against *Smuggling*, and another on the *Labouring Poor*, designed to correct practical abuses and errors of opinions then prevalent in England. During 1768, he also received intelligence of his appointment as agent in England by Georgia. In October of this year, while the king of Denmark was on a visit to London, he sought the acquaintance of Dr

Franklin, who became one of the sixteen invited guests at a public dinner of the Monarch. In January, 1769, two scientific Societies, which had existed in Philadelphia, one of which Franklin had projected, were united into one, called the *American Philosophical Society*, of which he was chosen President, and continued so, re-elected annually, to the end of his life. He endeavoured to promote the culture of Silk in America, and saw the business started in his time, and so much progress made as to render it certain that his anticipations would be finally realized. He was one of a committee of the Royal Society, to investigate the best method of protecting Cathedrals from lightning, and the method recommended by them for putting up electrical conductors was followed. On the 8th of December, 1769, he was chosen by a unanimous vote of the Assembly of New Jersey, of which his son was then Governor, as the agent for transacting their affairs in England, with instructions.

Franklin gave his unqualified opinion that the people of America would not be quieted by anything short of a total repeal of all the acts for collecting a revenue from them without their consent. Parliament met, and repealed the duties on all the commodities enumerated in the revenue act, except *Tea*. This rather increased than allayed the popular ferment in America; and the Assembly of Massachusetts approving Dr. Franklin's labours in promoting the cause of his country, on the 24th October, 1770, appointed him their agent to sustain their interests during the controversy with the mother country. His credentials were incredulously received by Lord Hillsborough, Secretary for American Affairs, and with something like an affront, which Dr. Franklin resented becomingly.

In charge now with the affairs of four Colonies, his time was necessarily much occupied with them. Some leisure, however, was essential to his health, and he accordingly made short annual excursions through different parts of England, spending as much time as he could spare at those country seats of learned and influential gentlemen, to which he had been invited. He also made a tour through Wales, Ireland and Scotland. Some of the happiest days of Dr. Franklin were passed in the family of Dr. Shipley, Bishop of St. Asaph. He was one of the very small number of Bishops who opposed, from the beginning, the course pursued by the Ministry in the American controversy.

In August, 1772, a committee of the Royal Society was appointed, of which Dr. Franklin was one, for the purpose of suggesting some method of protecting powder magazines from lightning. This was done at the instance of the British government. A report was drawn up by Dr. Franklin, and signed by the committee, advising the erection of pointed rods, with a minute description of the manner of constructing them. These suggestions are still acted on.

Matters still continuing to grow worse by the disregard of the rights and wishes of the Colonists by Parliament, Franklin published his *Rules for reducing a Great Empire to a Small One, and An Edict by the King of Prussia*; through both of which there runs an admirable vein of irony, bearing upon the matters in dispute, and attracted to them many readers who would scarcely have turned aside to a grave and argumentative discussion of the Colonial controversy.

In the Summer of 1773, he passed a few weeks at the country residence of Lord Le Despencer, and employed himself in abridging parts of the book of common prayer.

Many experiments were performed by Dr. Franklin, at different times and places, to show the effects of oil in smoothing the surface of water agitated by the wind; and he explained the operation of the oil in producing this effect upon water. He wrote a letter on the analogy between electricity and galvanism. He also sketched the plan of an elaborate essay on the causes of taking cold, and formed a theory by which he thought the nature of the malady would be better understood, and more effectual preventives used. A new edition of his philosophical writings were published in Paris in 1773, in French, and a fifth edition in English at the same time in London.

In December, 1772, Dr. Franklin procured and sent to Mr. Cushing, Chairman of the Committee of Correspondence in Massachusetts, certain original letters of Governor Hutchinson, Lieutenant Gov. Oliver, and others, which had been written to Mr. Thomas Whately, a member of Parliament, and at one time Secretary under one of the Ministers, which letters contributed to reveal the object of some of the most odious proceedings of the British Government against the Colonies, and subjected the Doctor to much obloquy and abuse from the supporters of Colonial administration for transmitting them. These letters were filled with representations as contrary to truth as they were insidious in design. They were invaluable to the Colonists as explanatory of the moral turpitude, and political manœuvring of their rulers. Dr. Franklin did not shrink from acknowledging that they were transmitted through him. A duel grew out of the subject between Messrs. Semple and Whately, for which Franklin was in no ways responsible. He had no private ends to serve in the transaction, and no other motives than justice to his country.

Whately commenced a Chancery suit against him, but finally dropped it. It was an ungrateful step in Whately, for whom Dr. Franklin had lately rendered an important service, by enabling him to secure a valuable property in Pennsylvania.

In presenting his petition from the Massachusetts Assembly, to the Privy Council, he was assailed in an abusive speech by Wedderburn, the petition rejected, and his dismissal from his place at the head of the American Post Office, announced to him at the same time.

When the Continental Congress was about to convene, and he was making preparations to return home, and looking forward to a happy meeting with his family after a separation of ten years, he received the afflicting intelligence of the death of his wife. They had been married forty-four years, and lived together in a state of uninterrupted happiness. She was attacked with a paralytic stroke, which she survived only five days.

(To be continued.)

METALLURGY, AND MANUFACTURE OF METALS.

GOLD WASHING.

But one invention, and that a foreign one, was patented during the years 1844–5, the main feature of which, is as follows:—"Heretofore, in separating gold from the impurities, by the process of washing, it has been subjected to only one current of water, either vertical or horizontal—the object being to carry away the impur-

ities that are of less specific gravity than the metal, and leave it behind; but the process in question subjects it to the combined action of two currents of water—one vertical, and the other horizontal; the former carrying the impurities above the level of the metallic particles, and the latter washing them away, by which the process is greatly expedited. The apparatus for applying this process consists of a series of sieves separated by partition, and surrounded by a casing with a valve opening upwards, and placed at one end of the series. The materials to be washed and separated are dropped into the first sieve of the series from the hopper above, adapted to the delivery in given quantities, and the sieves then receive a vertical reciprocating movement in a water tank. On the descent of the sieves, the water passes through the meshes of the sieves and the valve; the former producing the vertical current, loosening the lighter and impure particles, and carrying them above the partitions; and the latter, by its volume, the horizontal current, washing all that has been carried above the partitions to the next sieve, and so on to the end of the series, to catch the particles of gold that may have been carried up with the impurities."—*Ellsworth's Report, page* 464.

MANUFACTURE OF IRON.

During the year 1844, a patent was granted for the manufacture of malleable Iron directly from the ore. The following is in substance, the description of the process pursued by the Inventor.

"The manufacture of malleable Iron directly from the ore continues, and will continue, to attract the attention of the iron-master, until all the difficulties to its economical application shall have been surmounted, and science and art shall be able to claim this as another triumph. Within the past year, a patent was granted having this important object in view; and to satisfy the Iron interests, I here insert the description of the process given by the patentee, without meaning to be understood as approving or disapproving the suggestions of the inventor; which, as I have not heard of the practical test, might prejudice the inventor or the public.

The patentee proposes to carry on his process in puddling furnaces, so modified in form, by elevating the roof towards the chimney, as to avoid the reverberatory character, and thus prevent the flame from impinging on the ore, which (says the patentee) 'converts the larger part of it into slag, instead of reducing it into malleable iron.' The ores, instead of being mixed with flukes, in the usual manner, which has always been considered indispensable, are to be employed alone, by mixing together, in due proportion, such ores as by their chemical composition are calculated to re-act upon each other when duly heated, and to bring the metal contained in each of them into the malleable state—such as oxides and carburets of iron; the oxygen of the former uniting with the carbon of the latter, will, in the judgment of the patentee, liberate the particles of iron, which, when brought to the proper degree of heat, are to be balled in the usual manner of puddling."—*Ellsworth's Report, page* 468.

Another patent was also granted to the same person, for an improvement in reverberatory furnaces, to be used in the process above stated, or for puddling; which consists in placing the fire grate below the furnace hearth or floor, that the heat may be applied below and above.

A modification of the stack of smelting furnaces has been suggested and patented, which consists in dividing the stack into two, three, or more compartments, by means of partitions extending from the top to a point a little above the entrance of the blast. Into one of these divisions the coal only is put, and the usual charge of ore, coal, &c., in the others; and that part of the hearth which is below the coal division is elevated above the other portion, that the coal may be kept up to the blast, and permit the melted metal to descend below it. The patentee sums up the operations and the advantages in the following words, viz: "The greatest part of the charge being put in the compartment next to the headstone, the metal will rest on the boshes, and will not come down faster than it is melted by the blast, the principal part of which comes in through the body of coal in the chamber, from the blow-pipe; the combustion being thereby rendered perfect before the blast reaches the metal, a great saving of fuel is effected, and a better quality of iron is produced. The damper over the coal chamber is kept down during the operation, and the gases are allowed to escape through the chambers on the opposite side of the partition. The fuel in the chamber rests on the hearth, and cannot fall much below the blast. A small blast can also be thrown in on the opposite side of the furnace to the main blast, which is regulated at pleasure."

A variety of simple and compound substances have heretofore been mixed with iron in the melted state, with the view of more effectually separating the impurities, and producing a more highly refined metal. As a modification of these processes, a patent has lately been granted for mixing with the melted iron, in the process of puddling, a compound of sulphur and a nitrate with borax, soda, or potash and alum, broken in small lumps, and introduced below the surface of the melted iron; the proportions to be varied, if the iron is intended for the manufacture of steel.

We have, within a few years past, been astounded at the development of science, and the new phases put upon many branches of the arts by the development of electrical science, and the application of this mysterious and powerful agent; and such have been the developments, that, when the results of some new application of it are made known, belief is staggered for a while, until evidence comes so quick and strong, that incredulity no longer finds a resting place, and wonder follows close upon its steps. Such are the thoughts suggested by the examination of a patent granted for the application of currents of electricity to iron and other metals when solidifying in the mould, and when smelting in the cupola. As this invention has excited much inquiry, and its usefulness is so easily tested, I have deemed it important to insert the description of the process in the language of the patentee, which is as follows, viz:

"The nature of my invention consists in the use and agency of electricity in the manufacture of iron, steel and copper, and other metals—the object thereof being to facilitate the malleability and purity of the metals under the process of manufacture, as hereafter particularly described. And, in order to enable others skilled in the manufacture of the said metals to practise my invention, I shall proceed to describe the process to be pursued; and, first, with reference to the manufacture of iron.

"My said invention consists in subjecting the iron whilst in a fluid state, and also whilst in the act of con-

gealing or solidifying, to a current of electricity, which I cause to traverse as completely as possible throughout the entire metallic mass. In casting a bar or similar mass, I cause the current to transverse from end to end by conductors, properly placed for the purpose, and so arranged that, when the metal runs into the mould, it may be made to complete the circuit of the electric current; or I previously make such an arrangement, by means of a wire or wires, of iron or other metal, stretched in, or passing from end to end of the mould, so that the electric current may be, in the first instance, made to traverse the wire around or over which the fused iron is afterwards allowed to flow. There are other methods of performing this operation, and of making such arrangements as may admit of the melted iron, or the iron during its solidification, being traversed by or subjected to the influence of the electrical current. The following are instances of the mode in which I effect this in particular cases. If the castings are horizontal, I place at each end of the mould (which I suppose is to be made of sand, clay, or some similar bad conductor or non-conductor of electricity,) a piece of clear wrought iron, or other proper conducting metal, which is called the pole or conductor; and I then connect each of these poles or conductors, by means of a copper or other wire, with the extremities of a galvanic apparatus, or voltaic pile, or electro-magnetic or other battery, of sufficient power for the purpose. I have found that eight pairs of plates, of about four by six inches, consisting of alternations of platinum and zinc, arranged in separate cells of nitric acid, and dilute sulphuric acid, so as to construct what is usually denominated Grove's voltaic battery or apparatus, to be convenient for my purpose, and sufficient for a ton of metal, though any of the other forms of the voltaic apparatus or battery, or any other source of an adequate electrical current—particularly that commonly known as 'Smee's,' and consisting of from 20 to 30 pairs of plates of the above size—may be employed with advantage. Having then connected the extremities of the battery with the respective poles or conductors, in such a way that when the melted iron is allowed to run into the mould, it may so complete the electrical circuit as to admit of the castings being traversed from end to end by the electrical current, I allow the cast metal to cool and set while in that condition; and, as soon as it has entirely set or solidified throughout, the connexions with the battery may be broken through. I think it is advantageous, particularly in casting ordnance, to continue the electric current for some time after the metal has entirely solidified. When the castings are vertical, a similar arrangement is made for the passage of the electric current through the metal; and this I effect by placing at the bottom, or sole of the mould, a plate or rod of iron, or other conducting substance, while a similar conductor is inserted into the upper end of the mould, in such a way that the electric circuit may be completed the moment that the mould is filled with the liquid metal.

"In applying electricity to iron in a smelting furnace, or cupola, I insert one rod of wrought iron in or alongside of the top hole, until it comes into contact with the smelting metal; and another rod into the upper and posterior part of the hearth, or in at one of the tuyere holes or apertures, until it comes into contact with the surface of the metal—the outer ends of these two rods being placed, respectively, in connexion with the opposite poles of the electric battery, so as to complete the circuit; care being taken not to continue it so long as entirely to decarburate the iron, and bring it into a malleable state. In applying electricity to the iron in the puddling or balling furnace, I insert one rod, similar to the above, into one part of the fused metal; and I attach to one end of another iron rod an insulating handle of porcelain pottery, or other substance not conductive of electricity, and then fix to the end of that iron rod, close to the handle, the conducting wire from one pole of the voltaic battery; and the other fixed iron rod being connected with the other pole of the battery, I seize the insulating rod by the handle, and make its extremity traverse in contact with various points of the iron in its melted state, or during its transition into the solid state; thus making the electrical current pass through the metal in every possible direction.

"The part of my invention applicable to the manufacture of steel is as follows: The bars of wrought or other iron fit for the manufacture of steel are placed in the usual boxes and furnace; and, so far, I employ the same means and apparatus commonly called a converting furnace, and in common use. But, instead of imbedding the bars of iron for conversion in common charcoal, or in the carbonaceous substances in common use, I employ a mixture of charcoal, with the carbonaceous or other matters used by the sugar refiners, and through which their sirups have been filtered; these residues consisting chiefly of animal charcoal, derived from the combustion of bone and other animal or organic substances, and containing phosphate of lime. And I further add to this mixture a certain quantity of rosin, amounting to about one part of rosin to ten of the mixture. And I further imbue their carbonaceous substances, mixed and prepared as I have described, with a saturated solution of white arsenic in water.

"Having thus prepared the carbonaceous bed in which the bars of iron intended for conversion into steel are laid and enclosed, as in the modes usually adopted, I next make arrangements for transmitting a current of electricity through the bars, after they have been duly converted into blistered steel, and whilst they are still red hot; my object being to transmit such electrical current through each of the bars, together or successively, whilst cooling down in the furnace. This I effect by attaching an iron, copper, or other proper wire, to the ends of the bars, and bringing its extremities out of the furnace, so that at the proper time, a connexion may be made between these wires and those forming the poles or conductors of a voltaic apparatus or pile; and in this way the electrical circuit is so completed, that the current of electricity may be made, as aforesaid, to traverse the bars for a longer or shorter time. I prefer commencing the transmission of the electricity when the bars have become blistered steel, and are red hot in the furnace, and continuing the transmission till they have so far cooled down as to be capable of retaining magnetism. Now, although I prefer, as a source of electricity, that form of galvanic or voltaic battery, or apparatus, known under the name of Grove's battery, any other adequate source of electricity may be resorted to.

"And although I have alluded to blistered steel only, and described my process as applicable to it, I further claim its application to cast steel. And when thus applied to cast steel, the details of the process I prefer are similar to those which I have specified in regard to the transmission of electricity through cast iron; my object being the same in regard to the cast steel as to the

cast iron—namely, to subject it to the influence of an electric current whilst in fusion, and in the act of setting, and, to a greater or less extent, during the period of its cooling down to common or atmospheric temperature.

"As regards the manufacture of copper and other metals, the electric current is to be applied under the process of manufacture, in the manner hereinbefore particularly described with reference to the manufacture of iron."—*Ib, page* 469.

One patent was also granted for this object to a foreigner in 1845, who describes his process in the following language, viz:

"By my process, I am enabled, in a very short space of time, to manufacture wrought or malleable iron from the richer kinds of ore, such as the hematitic, and others, which contain not less than forty-five *per cent.* of metal, and which generally contain a considerably larger quantity; my process not being considered as adapted to the earthly ores, or to any of those which contain a less per centage of iron.

"Before proceeding to give the particulars of my process, I will remark that the invention herein described is the result of a series of experiments, by which I have ascertained that the attempts heretofore made for converting the richer iron ores into malleable iron, by means of carbonaceous matters in reverberatory furnaces, have failed principally from a want of knowledge of the effect of carbonaceous substances, when so employed, as regards quantity; the proportion added to the ore having been much too small to answer any good purpose, as it was not capable of de-oxydizing any considerable portion of the ore, and the means attempted were not such as would particularly prevent such small quantities from being again oxydized by the working of the reverberatory furnace. Although I do not claim, therefore, to be the first who has made the attempt to manufacture malleable iron from the ore in a reverberatory furnace, I do claim to be the first to have discovered the cause of former failures, and to have devised the means of rendering the process successful.

"In reducing the kinds of ore referred to, which consist principally of the protoxides and peroxides of iron, I have discovered that not less than from twenty to forty per cent. of carbon, by weight, and in many cases more, should be mixed with the ore when it is to be reduced in a reverberatory furnace; and I exclude from the list of those which are to be so treated all such as do not contain a sufficient quantity of oxygen to require the lesser proportional quantity of carbon above named. It will be seen, therefore, that my process applies to that class of ores which, under the ordinary mode of treatment, are deemed refractory, these being the most available when subjected to the process invented by me. With the several ores that I employ, the actual quantity of carbon, or of carbonaceous matter required, will vary considerably, although it will always be equal in amount to that above stated; and I will hereinafter give such information as will enable the workman to judge readily when he is using the proper relative quantity for the iron ore upon which he is operating.

"I commence my process by taking any of the rich iron ores, including under this denomination those only which will yield forty-five per cent. and upwards of that metal, either as they are obtained from the mine, or as they exist after the carbonic acid, or other volatile matter which they may contain, has been separated from them by being calcined or roasted, and which when so operated upon, will contain that per centage or more of iron by analysis. By means of millstones, rollers, or any other suitable apparatus, I crush or pulverize the ore, which I am about to reduce into particles, sufficiently small to pass through a riddle or screen, the meshes of which measure from one-fourth to one-eight of an inch, preferring the smaller size. To one hundred parts of the ore, or calcined iron stone, so reduced in size, I add from twenty to forty parts, and frequently more, of carbonaceous matter, such as coke, charcoal, peat, or anthracite, which has been in like manner reduced to powder and passed through a sieve, or screen, of the smaller size mentioned; and, after well mixing them together, I pass a charge thereof, usually of about five hundred pounds weight, into a puddling or reverberatory furnace, which may be of the ordinary construction, and heated in such manner as to be in a state suitable for receiving pig iron to be puddled. This mixture should be occasionally but moderately stirred up—say every five or ten minutes; and, after some time, dependent upon the heat of the furnace, as well as upon the particular ore under treatment, it will become pasty under ordinary circumstances; this takes place in about half an hour, the pastiness resulting from the hotter parts having become metallic, and adhering or welding together; the furnace is then to be brought to its greatest heat, and the charge balled; but the iron must be previously kept as "*open*" as possible, and care must be taken that it be not balled up too soon, otherwise it will be tender, and most probably *red short.* In about an hour and a half or two hours from the time of charging, if the furnace be properly constructed, the fuel good, and well managed, the charge will be ready for the hammer, and may be treated as puddled iron made on the customary plan.

"It will be obvious, from the remarks already made, that the definite quantity of charcoal or other carbonaceous matter cannot be prescribed, without taking into account the exact quantity of oxygen contained in the ore or calcined iron stone, and of the quantity of carbon, or of carburated hydrogen, supplied by the carbonaceous matter employed, but, from my experience, I would recommend, as an approximate rule, that where a hundred parts of the ore under treatment contain about fifty of metallic iron, about thirty parts of charcoal, or its equivalent in other carbonaceous matter, be added thereto, and for every additional two parts of iron in one hundred of the ore I would add one part of carbonaceous matter.

"I have sometimes combined with my process, of reducing the ores of iron in the puddling furnace the additional operation of bringing pig plate, or other cast iron, into the state of malleable or wrought iron, by adding portions of such cast iron to the mass which is being acted upon. This pig or cast iron, which is a carburet of that metal, not only assists in the reduction of the oxide of iron still remaining in the ore, but has its own carbon separated by the oxygen of the ore. I prefer to add the cast iron when the charge of ore begins to feel heavy or pasty.

"When the cast iron is thoroughly melted, and well incorporated with the ore, the action of each material on the other so rapidly quickens the process, that some difficulty is experienced in preventing its being balled too soon; but, as before stated, the mass should be kept

"*open*" at a high degree of heat. Thus not only does the addition of cast iron increase the production of malleable metal, with a given cost of time and labor, but it also, from causes scientifically accounted for, operates as a desirable adjunct in facilitating the process.

"I do not name the relative proportions of ore and of cast iron, nor do I limit myself to the time of adding them together, as these conditions may be varied at the will and according to the experience of the operator; but it is best to use a smaller proportion of cast iron when a very pure ore is being acted upon, or the quality of the wrought iron may be injured in some slight degree.

"The workman will, after a little experience, be able to determine whether the requisite proportionate quantity of carbonaceous matter has been added to the particular species of ore under treatment, by paying attention to the following particulars:

"First, if in the working of a particular description of ore, the return of iron be deficient in yield with reference to its known contents by analysis—say less than from two-thirds to three-fourths thereof—and that a larger proportion of slag or cinder runs from it than might be expected, and if all appearance of the presence of carbonaceous matter vanishes at an early stage of the process, there is manifestly a deficiency of carbon, and it must be increased in working the subsequent charges.

"Secondly, if the return be good, but the metal does not ball up readily, or stand the hammer well, and if a considerable portion of the carbonaceous matter be seen floating on the molten cinder at the close of the operation, there is too much carbon in the mixture, and in future charges its quantity must be reduced.

"Thirdly, if the cinder be moderate in quantity, if the iron ball up readily, if the carbonaceous matter disappear about the time of balling up, and the bloom stand the hammer well, the proportions may then be deemed correct."

This process has also been patented in England. Its usefulness can be determined by experience only. It is useless to theorise upon it.—*Burke's Report, page* 46.

BLOOMERIES.

Letters patent were also granted during this year (1845,) for a mode of applying the hot blast to Bloomeries, the following is the language of the inventor:

"In the manner of arranging the pipes for obtaining the hot blast, as herein represented and described, I do not claim that there is anything new, or of my invention, I having in this particular adopted a system of pipes for heating the air, first used in England, and known under the name of Nelson's pipes for the hot blast. My improvement consists simply in the manner in which I have combined these pipes with the bloomery forge-fire or chimney. I am fully aware that there is not any novelty in the mere application of the hot blast to the bloomery forge, this having been carried into operation in a great variety of ways; but I have, as I verily believe, so combined the hot-blast pipes with said forge-fire, as to obviate the several objections which have, in practice been found to interfere with those erected prior to my carrying my plan into operation. In most instances, the air has been heated in an arch erected at the tunnel-head of a furnace, within which head-pipes have been arranged in a manner substantially the same with that herein described; but in this case, as well as under some other arrangements, besides the necessity of erecting an expensive arch of fire-brick, the plan itself has not answered the purpose intended; the particles of ore and of cinder which have been prevented from escaping have been found to fill up the openings in the arch, to obstruct the draught, and to adhere to the pipes in such quantity as in a short time to prevent the air that passes through them from being duly heated, in a few day's use only, as I have repeatedly experienced; they are thus rendered incapable of heating the air to such a degree as to produce any useful effects.

"In my plan, it will be seen that the heating pipes, are in close proximity with the bloomery fire, and that I dispense entirely with the arch, while I give to my chimney such a form as to produce all its anticipated benefits, without its cost or inconveniences.

"Having thus fully described the nature of my improvement in the manner of applying the hot blast to the bloomery fire-forge, I do hereby declare that I do not make any claim to the applying of the hot blast thereto; nor do I make any claim to the form or combination of the pipes for heating the air, this being the same with numerous others which have been long known and used; but what I do claim as of my invention, and desire to secure by letters patent, is the manner in which I have combined said pipes with the bloomery forge-fire, by placing them within the chimney, immediately over said fire; which chimney is formed in the manner herein described and represented, so as to effect the desired object, without the use of an arch or any analogous structure. To this particular combination and arrangement I limit my claim."

Two patents have been granted within the past year, for the generation of the above mentioned combustible gasses, and their application to the manufacture of iron. Both are re-issues of patents granted and noticed previously, and it is therefore unnecessary to dwell upon them in this place.—*Ib. page* 49.

MANUFACTURE OF STEEL.

But one patent was granted in 1844 for the manufacture of steel; the leading portion of the specification of the patentee reads as follows;

"In the ordinary mode of constructing the converting furnace, the bars of iron, after being piled in the coffer, or oven, in combination with the carbonaceous matter, to the proper height, are covered with a stratum of fine clay and sand, or some analagous substance, which has to be removed every time the oven is charged.

"My improvement in the structure consists in the using of a permanent roof of fire stone or fire brick, in place of the temporary covering heretofore employed. I also use a sliding shutter, which is placed in front of the surface, so that it may be brought down as required for a purpose to be presently made known.

"My improvement in the manufacturing of the steel, after the process of cementation has been completed, consists in the taking of the bars first from the upper part of the convertory whilst they are at the highest temperature to which they are to be brought, and subjecting them immediately to the action of tilting, or of rolling, without the necessity of reheating. To do this, a part of the upper layer of bricks which enclose the converting oven is first removed, so as to enable me to draw out the upper bars; and as the bars are successively operated upon, the bricks are further removed, until the whole contents of the convertory have been tilted or rolled. As this process goes on the sliding shutter is brought down, so as to enclose the part from which the bricks have been removed. By this procedure several advantages are attained in the process of manufacturing steel. Under that hitherto followed, the whole charge has been allowed to cool down before removing the steel from the convertory, and this necessarily resulted in great loss of time; the bars, after being removed, had to be reheated,

in order to their being tilted or rolled. By this reheating time was consumed, and the steel actually injured; it being a well established fact, that every time it is highly heated it is deteriorated. The steel manufactured by my improved process has proved to be very superior to that made from the same iron in the ordinary way; it has, in this particular, uniformly exceeded the anticipated benefit."

MANUFACTURE OF METALS, &c.

BLACKSMITHS' FORGES.

In the working of Blacksmiths' Forges, the accumulation of cinder is a matter of much inconvenience, particularly where large masses of iron are worked. The accumulation of cinder has frequently to be removed, which not only consumes much time, but disturbs the fire. To avoid this inconvenience, an improvement has been patented, which consists simply in making the hearth of the forge to slide up and down in a sink or well, so that at every fresh charge of coal the hearth descends a short distance with the cinder on it; and when the hearth reaches the bottom of the sink or well, the whole of the cinder is removed through a hole in the bottom, and the hearth is forced up to the top to recommence.—*Ellsworth's Report, page* 473.

But little evidence of improvement in the Blacksmith Forge has come before this office during the past year, but one patent having been granted within that time. Blacksmiths have heretofore found considerable inconvenience to arise from the extinction of their forge fires, in the ordinary course of their work, which is such as to leave the fires unused occasionally for intervals of time. The fire during this time becomes extinct, and time and fuel are consumed in rekindling. To obviate this difficulty, and to render the forge portable, the patentee has provided it with panels, which slide in grooves in the cover and bottom of the forge, in such a manner as entirely to surround the fire, leaving a small opening at the bottom for a moderate supply of air to it, and another at the top to perform the ordinary office of a chimney.—*Burke's Report page* 50.

FORGE OR TRIP HAMMERS.

A patent was granted in 1844, for working the hammer by means of two rollers, that receive motion from a steam engine, or other motive force, one of which has its bearings in permanent, and the other in moveable boxes connected with a toggle-joint or other lever, so arranged as to force this roller towards the other, and gripe a square roll on the hammer to lift, and then separate them to liberate it—the toggle-joint lever being connected with the roller by means of a powerful spring; and the mechanism that operates the toggle so arranged as to enable the attendant to regulate the play of the hammer at his discretion, to strike a light or heavy blow, as the condition of the iron may require.—*Ellsworth's Report, page* 473.

BLACKSMITHS' ANVILS.

The forging of Blacksmith's Anvils is an operation attended, as may well be imagined, with some difficulty, not only from their size, but principally from the peculiarity of the form. With a view to facilitate and cheapen the operation, an arrangement of dies and swages has been patented, which is ingenious, and appears to possess merit. Attempts have often been made to give the desired forms to anvils by swaging; but in giving the form between the top and the stand, the face was always destroyed; and in restoring the face, the reverse effect was produced. To avoid this difficulty, the die which receives the horn, and gives one of the curves, extends up to form a rest, against which the face of the anvil rests, and which preserves it when the swage is brought down to give the required form. There are other minor improvements in the arrangements of the parts of the machinery, to facilitate the presentation of the anvil to the various swages and hammers employed in the series of operations.—*Ib. page* 474.

BUTT HINGES.

Some improvements in the manufacture of *butt-hinges* either of cast or wrought iron, were patented during the year 1844, relating to the arrangement of the moulds to facilitate the moulding of *cast-iron butts*, so as to secure their accuracy. And in the making of *wrought-iron butts*, the improvements relate to that part of the machinery employed in preparing the plates of metal for the machine that bends the knuckles, and for trimming the parts after being formed.—*Ib. page* 474.

But one patent was granted during the year 1845, for butt-hinge machinery, and that was a re-issue of an old patent for making the joints, &c., of wrought iron hinges, by the use of appropriate cutters and dies. The patent is too well known to require description. Two patents were also granted for improvements in window-blind hinges.—*Burke's Report, page* 51.

MANUFACTURE OF PINS.

In the manufacture of Pins, the very able reporter for the year 1844 makes the following appropriate remarks:—"The machine for sticking pins in papers, to which your attention was called last year, although an important improvement in this branch of manufacturing industry, was very imperfect, from the circumstance that the operatives had to arrange the pins with the heads all in the same direction—the most troublesome part of the operation, from its excessive tediousness. But this difficulty has since been removed; and now, by a simple contrivance, the pins from a mass put into the hopper, run down two inclined planes, placed at such a distance apart as to receive their shank, but not the head; and in this way, with the point down, they are delivered in the machine, which sticks them in the papers for market. This is the only improvement, connected with this branch of manufactures, which has come to my notice in a manner that can be made public, although there are various improvements in progress. In the space of a few years, by the efforts of a few ingenious men, an article for which we were wholly dependent upon England is now entirely or nearly so, produced at home.—*Ellsworth's Report, page* 474.

But one patent was granted during the year 1845, for the manufacture of Pins, and that to a foreigner. It is proper to remark, says the reporter, that the pin machinery of this country is far superior to any other in the world. The machinery patented, however, has its important characteristics, and will be understood by reference to the claims which I give, as follows: "Having now described the construction of the improved machinery to be employed in the manufacture of nails, rivets, screws, and pins, I desire it to be understood that I claim, in reference to the heading of metal rods or wire for the above purposes, the means of effecting what I call a 'double upset,' viz: by crushing the end of the rod or wire for forming the boss or head of the nail, rivet, screw, or pin, by two or more operations of a single heading-punch and pair or set of holding dies, and the sliding guides, the whole in combination as above described, the rod or wire being brought forward between the holding dies a short distance by the sliding guides, after the first or partial crushing of the metal, to complete and perfect the form of the boss or head, when the second pressure of the punch is brought up against it. As respects the pointing of pins, and discharging them from the machine, I claim my improvement therein—the same consisting in imparting to the sliding bar certain alternating lateral and back movements in its bearings, as described, whereby the pins are turned in opposite directions during the action of the mill-roller

upon them, and discharged from the machine when the pointing of them has been completed."—*Burke's Report, page* 51.

FILE CUTTING.

This operation has in general been performed by hand, when the best article was required. As it is almost impossible to find a blank of the same degree of hardness throughout, the blow upon the chisel should vary in force, not only according to the *width* of the blank to be cut, but also according to its varying hardness. Both of these requisites can easily be attended to by a skilful operative; but as these varieties of hardness occur irregularly, no machine has yet been invented which can perfectly adapt itself to them.

One file cutting machine has been patented within the last year, in which the file blank is placed upon a carriage under the chisel, so that the edge of the chisel shall make the desired angle with the blank, the parts being adjustable in this particular. The hammer which operates upon the chisel works like an ordinary adjustable tilt-hammer. The force of the blow is regulated by a spring, the power of which is again regulated by the width of that part of the file upon which the chisel is operating; and thus, if the blank be of nearly equal hardness throughout, as it moves onward by the regulated intermittent motion of the carriage, it will be properly cut.—*Burke's Report, pages* 51–2.

SPIKES, NAILS, AND RIVETS.

But one patent was granted during the year 1844, under this head, and that was for making wrought nails, the invention of an American citizen residing in England, and another for feeding or presenting the rods to nail-cutting machines; and these have not, to my knowledge, been reduced to practice. The former changes entirely the mode of operation which is pursued in machinery for this purpose, now, and for some years past, in successful practice. Instead of forming the nail from a rod in the direction of its length, as now practised, a plate is introduced, from which, at each operation, a piece is cut off, griped, and held against the face of the bed cutter, until a roller passes over it to give the required form to the nail, which is afterwards pointed and headed. The machine is more complex than those in operation; but may possess superior advantages, which I have not, however, been able to appreciate. And the latter is intended to effect the presentation of the rod to the action of the cutters, in a manner similar to that pursued when done by hand, and different from those heretofore employed for that purpose. As one end of the nail is thicker than the other, it becomes necessary to reverse or change the inclination of the rod at each time a nail is cut, to make the head end from opposite sides at each successive operation. By hand the former course is pursued, which prevents the action of the cutters from bending the rod; but by the machines heretofore employed or essayed for this purpose, the inclination only has been changed; and the object of the present improvement is to effect the presentation of the rod in the same manner as by hand, and thus prevent the tendency to bend the rod.—*Ellsworth's Report, page* 475.

Only two machines of this class was patented during the year 1845. Very little progress in improvements have been made in this department for several years.

LOCKS, BOLTS, &c.

Several patents have been granted during the past year for improvements in door locks and latches. The door locks are all on the well-known permutation or combination principle, and are contrived with a view of preventing the opening of the lock by picks, which can be effected with the best permutation locks when the bolt is so situated that pressure can be applied to force it back; the unavoidable elasticity of the metal of which they are made enabling a skilful picklock to move them in succession to that position which will permit the bolt to move back. The locks in question are arranged with a secondary impediment, or impediments, so connected with the main combination tumblers as to be moved by the latter when pressure is not applied to the bolt to force it back until after the tumblers have been brought to their proper position, but which are prevented from moving by the application of pressure to the bolt. And the improvement in latches has reference to the simplification of the moving parts, to render them cheaper and less liable to be deranged.—*Ellsworth's Report, page* 475.

Some ten patents have been granted for machines belonging to this class during the year, and, although several of them are useful, no one seems to possess that distinctive character or commanding importance which entitles it to notice above the rest. They are all modifications of locks, latches, &c., previously in use.—*Burke's Report, page* 52.

TOOLS.

Several patents have been granted for a variety of instruments or machines generally known under the appellation of *tools*. Several of them are for boring and drilling iron, and for filing saws by the turning of a crank. A bench vice has been made the subject of a patent, which presents an important and distinctive feature, and appears worthy the attention of artisans who use such tools or instruments. It consists in connecting the movable jaw with the permanent one, by means of a universal joint; so that the movable jaw, instead of being always parallel with the permanent one, can take any angle, and thus adapt itself to the form of the article to be griped.—*Ellsworth's Report, page* 475.

Several inventions of machines under this title have been patented during the year: such as the blacksmith's vice, hammers, augers, saw-filers, drills, &c.; but there is but one which it is necessary to describe. Letters patent have been granted within the year for a machine for boring the cylinders of rotary steam engines, and for other similar purposes, which deserves notice. The operative part of the machine is attached to the end of an arm, which is attached to, and revolves with, a shaft, which is placed in the position which the shaft of the rotary engine is intended to occupy. The cutter is attached to a small shaft which revolves in the outer end of this arm, and is perpendicular to the arm and to the main shaft. It will readily be perceived, that with this arrangement, when the cutter is properly set and the solid ring of metal is placed around the main shaft and properly adjusted, the revolution of the main shaft—the ring being immovable—will cause the cutter to cut a slight groove in the rim. The shaft of the cutter is then geared by cog-wheels, &c., to an immovable cog-wheel, surrounding the main shaft in such a manner that the cutter shaft will revolve very slowly as the main shaft revolves, and thus the width of the groove at first cut is increased by degrees until the boring is completed. It will be evident that the groove bored in this manner will every where, when cut by a plane passing through the axis of the main shaft, present a portion of a perfect circle of an uniform radius.

Other patents have been granted within the year for inventions more or less meritorious belonging to the class of metallurgy and the manufactures of metals, but to notice them all particularly would be to extend this part of my report beyond its appropriate limits.—*Burke's Report, pages* 52–3.

LEAD PIPE.

In the manufacture of lead pipes, it is alleged that, in forming the pipe from lead in the fluid state, it will adhere to the core which forms the inner part of the pipe; and as the making of pipes from lead in the heated, but solid or set state, has been patented, various efforts have been made to dispense with this, and to improve it. A patent has been granted lately for pass-

ing a current of steam, or other fluid, through the core, to keep its temperature below that of melted lead, and thus prevent it from adhering. This branch of manufactures is now extensively carried on, and will continue to increase, from the circumstance that lead pipes present so many facilities in manufacturing and domestic economy; and, therefore, every improvement or suggestion connected with it must command interest.—*Ellsworth's Report, page* 476.

For several years past valuable machines have been in use in this country, and a vast amount of pipe has been manufactured. The machines in use give satisfaction, and the improvements made in this branch of manufactures have reference to minor details, while the general characteristics of the machine are preserved. Two patents have been granted the past year for such improvements. In one of the machines patented the cylinder from which the lead is forced through the matrix or former is substantially a double-acting force pump, and is connected with an air chamber for the purpose of preserving a regular stream. This cylinder is located partly within the heater and partly within the furnace. By this construction the operation of forming the pipe can be continued any length of time—the cold lead being regularly supplied to the heater, and one end of the cylinder being filled by suction, (pressure,) while the lead is forced from the other into the air chamber, and thence continuously through the apparatus for forming and cooling the pipe. The other patent is for tinning the interior of the pipe, which is effected by forcing the melted tin, during the formation of the pipe, into a tube in the core, and thence discharging it, through numerous small openings on all sides of the mandril, upon the interior of the pipe.—*Burke's Report, page* 52.

IRON PIPE.

The great variety of purposes to which iron is applied, and the advantages which its use presents, every day enlarge the demand for it, and not a day passes without its being applied to some new purpose; but the great affinity which it has for oxygen, and therefore its tendency to corrode, retards very much its application to many important purposes, such as the construction of ships; and as the protection of it against the action of oxygen would remove this difficulty, science and ingenuity are making bold efforts to discover or devise means of coating the surface in such manner as to prevent galvanic action; and several patents have, within the past year, been granted, in this country and in Europe, for processes for coating iron in such manner, and with such substances, as to prevent corrosion.—*Ellsworth's Report, page* 476.

MANUFACTURE OF FIBROUS AND TEXTILE SUBSTANCES.

COTTON GINS.

Several patents were granted in 1844, for alleged improvements in cotton gins; one for a modification of the roller gin for a long staple, which consists in so arranging three rollers, (one large and smooth, and the others small and fluted,) that the cotton passes in between the two small ones, and then between the upper small and the large one; by which the inventor alleges that the fibres are more effectually separated from the seeds and foreign matters, and delivered in a more perfect manner, than by the other modes. And the others are for arrangements of extra ribs on the saw gin, to retain the fibres more effectually whilst the brushes act upon them and straighten them; and for new arrangements of brushes, &c., to insure a better action on the fibres, and a more perfect delivery of them.—*Ellsworth's Report, page* 476.

Several patents were granted also in the year 1845, for cleaning cotton, and one for ginning the long staples. This cotton gin is an improvement upon that variety which is known as the "roller gin." So far as I am acquainted with the machines heretofore in use for that purpose, they have produced to some extent an injurious influence upon the cotton, in consequence of the pressure, rubbing, and strain upon the fibres, made by the rollers; the cotton thus becomes "dead," as it is termed, and can be easily distinguished from that which is picked by hand; while the machine patented is said to produce an article *equal* to that picked by hand. The cotton is carried from the hopper, by a toothed cylinder, to a large cylinder with fan beaters or ribs, which is covered by a cylindrical case that opens on the side opposite to the feeder into a funnel-shaped box, whose bottom inclines downwards. The large ribbed cylinder, as it revolves, takes the cotton from the feeder and throws or blows it down to the lower end of the box, where there is an opening to two grooved ginning rollers, to which the cotton has easy access. These rollers, as they revolve, are prevented from separating by a weighted lever resting upon an adjusting screw. The ends of the rollers are made for a short distance smooth, and of the slightest increase of diameter, which keeps the grooved portion of the rollers separate from each other, but not so far as to prevent their drawing the cotton between them. The pressure of the weighted lever does not come upon the cotton unless the supply is too large, and in that case it operates to regulate the supply. Thus the injury arising from pressure, straining, &c., is avoided. A little above and in front of the upper ginning roller, and a little below and in front of the lower one, there is placed a fluted roller, working very near to the ginning rollers, and in opposite directions, (at the points where they meet,) which strip the ginning rollers of the long fibres which would otherwise wind around them. The operations of this machine are said to be entirely satisfactory: and if so, an important step has been taken in this branch of manufacture.—*Burke's Report, pages* 53–4.

MACHINES FOR BREAKING FLAX AND HEMP.

A greater part of the applications for patents in this department, for the last two years, have generally been granted for slight modifications of pre-existing machinery, still operating upon principles well known. As it was truly remarked by the able reporter of 1844, most of those who have applied their minds to this, as well as other subjects, had not in their possession the means of ascertaining what has been done before, both in Europe and this country; and the consequences have been, labor lost and hopes blasted. We would take this occasion to remark, that it will be the province of the Mirror of the Patent Office to supply this deficiency, and lay before its patrons full information upon all subjects relating to inventions.

One patent was granted during the year 1845, which presents, says the able reporter of that year, a feature distinguishing it radically from the rest; we therefore present a description of the same, in the reporter's own language. The breaking of flax or hemp has heretofore been effected by a series of permanent blades, variously arranged, with movable blades arranged in a manner to correspond, and working between them, or by its being carried between fluted rollers, &c., &c. While the hemp is unbroken the stalk is of such a form, and the fibre adheres to the woody part in such a manner, that if the stalk be broken abruptly, without previous preparation, or if rubbed violently by any machinery used in breaking, more or less of the fibres will be broken or injured. The machinery heretofore in use, and above alluded to, has generally been of a character thus to injure the fabric, though the defect in some is vastly less than in others. To remove this imperfection in pre-existing machinery, the patentee above alluded to first receives the hemp, &c., from the feeding apron between two smooth rollers, which flatten it and slightly disengage the fibres

from the woody part, and afterwards feed it to a double series of *small smooth* rollers, the upper series working opposite the spaces between the lower ones, the rollers of each series being placed so as nearly to touch each other, and the upper series being pressed down upon the lower by weights, &c. The surfaces of all these rollers move with a speed equal to that of the flattening and feeding rollers, and in the same direction, so that the hemp is carried through these series of rollers, and is successively bent in a short curve upwards and downwards, without the slightest tension, rubbing, or injurious breaking, until the fibres are entirely loosened from the woody part, which can then be shaken or beaten out in any convenient manner. The patentee unites the above described machine with other parts for cleaning, which I do not deem it important to describe.

Some of the other machines patented during the year approximate the same point which seems to have been attained by the inventor whose machine I have described.—*Burke's Report, page* 54.

MACHINES FOR WOOL COMBING.

Several patents have been lately granted for the combing of wool. In one of these machines the combs are arranged on radial bars attached to the face of a disk-wheel, in such manner as to be parallel with the face of the disk, and at right angles with the radial bars from which they project; and these, in combing, act in conjunction with teeth or combs, radiating from the rim of another wheel, and also carry the fibres around, to receive the action of rotating brushes. In another machine, a foreign invention, patented in this country, the teeth on the main or carrying wheel project from the rim of a wheel in lines parallel with the shaft, as in machines previously known and used; and the teeth of the combs that act in connexion with these are made coarse at one end, and gradually finer towards the other, and the fine end is placed nearer to the carrying teeth on the wheel than the other; and the working combs have, in addition to their rotary, a movement towards and from the carrying teeth; and the wool is applied to the carrying teeth by means of feed rollers that lash or lay it on.

A patent has also been granted for an arrangement of toothed cylinders, &c., for the purpose of subjecting the fibres of wool to the action of teeth, for the purpose of loosening the fibres, and removing moats and burrs, and to currents of wind, for carrying off all impurities.—*Ellsworth's Report, page* 476.

Three or four patents were granted in 1845, one for carding, and the others for cleaning and burring; they do not differ materially, however, from machinery already in use.

CARDING MACHINES.

Such was the rapid progress made a few years since in machinery for carding cotton and wool, that we now see but few attempts at improvement. One patent has, however, been granted, for a mode of cleaning the cards, which consists of a roller covered with long wire teeth, and so located as to act on the cards beyond the stripper, and which, entering between the teeth of the cards, cleanses out all that may remain between them. This cleaner is applicable to the stripper, as well as to the main card.

Another improvement has been proposed, and patented in England, which "consists in a peculiar adaptation of endless bands of wire cards to a carding engine, by means of which equal quantities of fibrous materials are taken from the main drum or cylinder of the carding engine, in a great number of distinct bands or strands of continuous slubbings or rovings. In effecting this object, no material alterations are made in the construction of the carding engines from those usually employed for carding fibrous materials, but only so far as regards the peculiar adaptation and arrangement of endless cord bands." For a full description and drawings, see London Journal of Arts and Sciences, volume 24, conjoined series, page 253.

In the same journal, volume 25 of the same series, page 124, will be found a description of a mode of making the backs of all kinds of cards, which, as a matter of economy, is worthy the attention of manufacturers. It "consists in forming the back of wire cards of those descriptions of leather called sheep-skin, basil, and roan-basil, cemented to woven fabrics."—*Ellsworth's Report, page* 477.

SPINNING MACHINES.

But three patents were granted in 1844 in this department; one of them the well known ring-groove spinner, by which the cost of construction is much reduced, and the carrier, or flying hook, is removed from the ring with great facility. Another is for a modification of the mode of giving the necessary motion to the bobbin for winding on, by placing the bobbin which runs on a dead spindle on a washer, provided with arms that extend to the wings of the flyer, by which it is carried around; the friction between the washer and bobbin being sufficient to give to the bobbin the desired motion for winding. This improvement is considered by the patentee especially applicable to the making of roving, and all operations in the spinning department admitting of but a gentle pull. And the last is for an improvement well worth the consideration of manufacturers. It consists, in the words of the patentee, "in giving to the bobbins, flyers, and spindles, the required rotary and traversing motion, by causing the bobbin to rest on the peripheries of wheels, arranged on a horizontal traversing shaft or shafts." By means of this arrangement bands are entirely dispensed with.—*Ellsworth's Report, page* 478.

Cotton, prior to being spun, is formed into roving, which is sometimes deposited in cans, from which it is withdrawn to receive the necessary additional twist. The ordinary mode of depositing the coils in the can is around its inner sides, leaving a considerable space in the middle, thus limiting the quantity it will contain, and leaving the coils in danger of falling in such a manner as to become entangled with each other and break. To remedy these inconveniences a machine has been invented by a foreigner, for which letters patent have been granted within the year. In this machine the guide for the roving, together with the drawing rollers, revolve upon a shaft which is eccentric to the can to such a degree, that, as the guide and drawing rollers revolve in one direction, and the can in an opposite direction, with different velocities, the roving is deposited in coils or loops, which extend from the centre of the can to the sides in all parts of it. Thus the can is filled, the roving well supported, and in condition to be easily withdrawn without breaking.

Several patents have been granted for improved machinery for spinning. In one of those machines the bobbins of the whole spinning frame are supported by their lower and inner edges, upon the outer edge of a large horizontal wheel, from which they derive their motion.

At high speeds the "live spindle" has been found to vibrate to such a degree as to break the thread so often, that it has been necessary to drive it at a speed much less than is desirable. This inconvenience was to a considerable degree obviated, by supporting the spindle in a tube extending up from the traverse rail, which very much diminished its vibrations; still, however, it was found necessary to limit its speed. Letters patent have within the year been granted for extending the tube both above and below the traverse rail, by which improvement it is found that the spindle can safely revolve at a much higher speed than before.

Two or three years since, letters patent were granted for supporting the bobbins in the spinning frame by the edge of the belt which gave them their motion. This mode of supporting

them is said to be defective, inasmuch as the bobbin frequently flies up from the belt; and when that is the case it fails to receive the necessary rotary motion. Letters patent within this year have been granted for an improvement intended to remedy this defect. For this purpose the lower end of the bobbin is extended down a little farther than the width of the flat belt which is used. Around this lower part of the bobbin a groove is cut, of proper width to receive the belt loosely, and of sufficient depth to prevent pressure upon the bobbin by the belt. This groove receiving the belt, if the bobbin rises or flies up the lower flange of its groove will touch the belt, and receive its proper rotary motion from it.

The foregoing are nearly all the patents connected with the subject of spinning which have been granted during the year. —*Burke's Report, page* 55.

WEAVING LOOMS.

The patents granted for 1844, in this department, were for modifications of those parts of the machinery by which the yarn is given out, and the cloth wound up as fast as the weaving is effected, and by which these operations are adapted to the constantly varying thickness of the filling yarn, or weft, and for arresting the loom when the shuttle fails to carry the weft through the warp—operations requiring a delicacy of mechanical sensibility, (if I may be permitted to use the expression in reference to inert matter,) which was but a few years back pronounced beyond the reach of possibility. Other improvements have also been patented for modes of shifting the shuttles in weaving fabrics, requiring changes of colors in the filling at given periods—such as plaid cloths, which, having of late become very fashionable, have stimulated the inventor to exertions in this line; for, after all, with inventors, as with other men, gain is the greatest of all incentives to action.

The instruments employed in looms for keeping the cloths distended widthwise, and called "temples" in technical language, have also received some contributions during the past year.—*Ellsworth's Report, page* 479.

Nine or ten patents have been granted during the year for improvements in various parts of the loom; but such machinery is generally of a character so complicated, that it would be impossible to give an idea of improvements made upon it, without elaborate drawings and descriptions. In one of the looms patented the improvement consists in attaching to the loom a simple apparatus, which, in ordinary weaving, will answer as a substitute for the Jacquard. Its merit consists partly in the ease with which it can be attached to hand-looms already constructed, which have no machinery for raising the figure. In many cases it may be very useful.

In weaving by power, where the shuttle is thrown with great force, and is arrested by the picker in the opposite box, the steel point of the shuttle sometimes penetrates the picker, and adheres to it in such a manner as seriously to interfere with the movements of the shuttle-box. In one of the looms patented this inconvenience is obviated by placing on the picker cam a slight protuberance which shall operate upon the treadle at the moment the shuttle is at rest, in such a manner as to move the shuttle forward far enough to clear the picker; and before changing the box the treadle is relieved, and the picker falls into its usual resting place, so that neither shuttle nor picker will interfere with the operations of the box.

In weaving Brussels carpets, and other figured fabrics of a similar texture, some parts of the warp are occasionally worked into the fabric with much greater rapidity than others, while the tension on all should be the same. This circumstance renders it necessary to provide a means of producing the proper tension upon the threads, and to provide also for regulating the delivery of the yarn as it may be required. The yarn, instead of being rolled upon a yarn beam, as in the case of ordinary weaving, is placed upon bobbins which can deliver independently of each other. Letters patent have been granted within the last year for a mode of accomplishing the objects above mentioned, which will be understood from the following description, which is nearly in the words of the inventor:

"The nature of my invention consists in suspending a weight on the yarn, forward of the spool or bobbin, which is so arranged as to unwind the yarn at intervals, as the slack is taken up by means of a catch which holds the bobbin from turning till lifted by a weight.

"The spools are arranged in a frame in the usual way, and just in front of each spool two wires are fixed in the frame; the catch is formed of wire, the ends of which are attached to a thin plate, the position of which is over the wires above named, and extending from end to end of the spool. The wire curves downward at each end of the spool to a point just behind it, where it is coiled round a pin forming a fulcrum for it in the frame; from thence it is bent upward, and crosses over behind and parallel with the spool, and resting against it; from the rim of the spool project one or more pins that strike against the wire; this prevents the spool from turning to unwind the yarn. The yarn runs from the spool forward over the wire, nearest to the spool, and thence it passes down to the weight that is suspended by it, and from that over the other wire to the shed. By this, it will be obvious that as the slack yarn is taken up the weight will be raised, and when the yarn is let off from the spool it will fall, and all the time continue to keep the yarn stretched with an equal tension. The weight consists of a ball, or other shaped poise, from which a rod projects; about the middle of the length of this rod is a flattened enlargement, through which there is a hole, and from this a slot is cut diagonally downwards, thus forming a hook, by which the weight is hung on to the yarn, and leaving a portion of the rod to project above it. When the slack of the yarn is used up, as above named, and the weight is raised, the upper end of the rod passes up between the wires, strikes against the plate above, and raises it; this relieves the pin on the spool from the catch, and allows the spool to turn, which lets off yarn, and causes the weight to descend; the catch being again brought into contact with the spool, stops its revolution as it comes round.

"It will be obvious that the arrangement of the bobbins in the frame or creel can be varied, as well as that of the catches; for instance, placing them endways towards the loom, or vertical, and so adapting the catches or weights as to act in that position without changing the general principle.

"What I claim as my invention, and desire to secure by letters patent, is the combination of the weight and catch with the bobbin or spool, constructed and arranged in the manner and for the purpose substantially as herein set forth; so that when the weight is drawn up it will relieve the catch, and allow the spool to unwind and the weight to fall."—*Burke's Report, pp.* 55–57.

KNITTING OR STOCKENETT LOOMS.

Two patents have been granted for this purpose: one for an arrangement of the sinkers, or looping jacks and needles, with the view of bringing the operative parts employed in the formation of the loops more directly within the reach of the attendant's eyes and hands, together with minor arrangements of the other parts; and the other, for an entirely new arrangement of the mechanism around a central shaft, so that the machinery weaves or knits an entire circle without seam. The thread is carried continuously around, and the stitches or loops are formed one after another, in succession, around the entire circle. This invention exhibits much ingenuity; but whether it will prove successful in practice, is a question which expe-

rience alone will fully test, in an economical point of view, as there is no doubt of the operation of the machine.

The great desideratum in this class of machines has not yet been attained, and is surrounded by difficulties. Most of the articles formed by knitting require to be shaped by widening and narrowing—as in knitting stockings by hand—an operation now performed by hand in all machines for this purpose; or, (as it has been practised in Europe,) the fabric is woven in the piece, and then cut of the required form and sewed together. But when made in this way, the articles sell at a very low price in the market, because of their inferiority to those shaped in the loom. If this operation of shaping be formed by the hand, there will necessarily be very little saving in working the machinery by power, for the attendant must be there to shape the fabric; and, therefore, until this operation, which is by far the most difficult, be performed by automatic hands, power machinery will have very little the advantage of hand knitting looms.

The following is a description of a process patented in England for rendering cotton fabrics repellant to water, &c., viz:

"This invention is intended to be applied chiefly to fustian cloths, called 'beaverteens,' although it is also applicable to other cotton fabrics. It consists in rendering the fabrics repellant to water and mildew, and preventing any unpleasant smell, by steeping them in, or passing them through, the solutions hereinafter described.

"As the general practice of dyers is to mix their solutions with reference to the weight of the cloth or other material to be immersed therein, and without regard to its length or width, the patentee describes his process upon this plan—the quantities mentioned being calculated for fabrics, of which a piece sixty yards long and twenty-seven inches wide will weigh forty pounds.

"To prepare a solution in which the fabrics are to be immersed, the patentee proceeds in the following manner: Twenty pounds of calcined British gum are mixed with eight gallons of cold water, in a suitable vessel or vat, until fine and pasty; then ten pounds of palm or white soap are dissolved in eight gallons of boiling water, in another vessel; and this solution is added to the former, together with one pint of logwood liquor, and the whole is boiled up together; three pounds of rock alum, dissolved in one gallon of water, are then added; and the mixture, after boiling for a few moments, is ready for use. The cloth or fabric (having been previously prepared and dyed in the ordinary way) is steeped in, or passed through, the above mixture or solution, in the usual manner of stiffening and drying cotton fabrics.

"Sometimes the patentee uses two solutions in succession—one of which is formed by boiling six pounds of sulphate of zinc in nine gallons of water, and, when cold, drawing off the clear solution; the other is made by dissolving twenty pounds of calcined British gum in eight gallons of cold water, and ten pounds of palm or white soap in eight gallons of boiling water; then mixing these two solutions, and, after adding a quarter of an ounce of pearlash, bringing them up to a boiling heat. The cloth or fabric is first steeped in or passed through the zinc solution; and is immediately afterwards steeped in or passed through the other solution."

For the benefit of those who are engaged in making ornamental fabrics, I here insert the essential parts of the specification of a patent granted in England for coating cloths, leather, and other fabrics, with metal, by electricity, viz:

"The first part of this invention consists in coating with metal, by electricity, various felted and other fabrics, such as cloth, linen, leather, paper, glass, earthenware, and similar non-conducting substances, by bringing the fabrics into contact with conducting furnaces.

"The patentee illustrates his invention by describing the method which he adopts for coating metals with copper, but any other metal may be used. A plate of copper (which the patentee terms a die or matrix) is coated on one side with varnish, or other suitable non-conducting material, and the other side is rubbed over with plumbago, to prevent the adhesion of the metallic deposite. Upon that side of the plate which is covered over with plumbago, the cloth to be coated with metal is placed, and secured by cementing, or otherwise; and the matrix is then immersed in a solution of sulphate of copper, and connected with the zinc pole of a galvanic battery; another plate of copper being then immersed in the solution, and connected with the copper pole of the battery, the deposition of metal upon the matrix commences. When the surface of the matrix is covered with a thin film of copper, the depositing begins to penetrate the interstices of the cloth, and if the operation continues sufficiently long, will appear in small globules at the opposite side. As soon as the required thickness of metal has been deposited, the matrix is removed from the solution, and the cloth separated therefrom. The surface of metallic coating will be either plain or ornamented, according as the surface of the matrix is prepared, whether plain, or ornamented with a raised or sunk pattern; and the metallic deposite may be afterwards gilt, plated, or otherwise improved in appearance.

"Instead of using the copper plate alone as above mentioned, the patentee sometimes employs as a matrix a plate of copper, together with a plate formed of an alloy of six parts lead to one of antimony; or, in lieu of this compound matrix, the copper plate may be used in connexion with gold, silver, or lead, in the state of foil."

Those who feel an interest in this process, and who may desire to make a test of it, will find a full description of the apparatus in the London Journal of Arts and Sciences for September, 1841, page 96.—*Ellsworth's Report, page* 479.

COTTON BATTING.

Within a few years this article has become an important and extensive branch of American manufactures, and has recently drawn to itself the attention of inventors to such a degree, that four applications have recently been passed for improvements in its manufacture. The bat of the required length and thickness being formed by any convenient process, it becomes necessary to cover it with a thin coat of size, after which the fabric is dried. The extreme delicacy of the bat, and the very slight adhesion of the fibres to each other, render the process of sizing and drying one of considerable difficulty. The improvement made by three of the patentees I will give you in the words of the inventors, as extracts from the patents will present them clearly and concisely. The earliest of the four patented improvements will be understood by a perusal of the following extract, taken from one of the other patents:

"The nature of my invention consists in arranging the sizing rollers immediately above an aperture in the top of a drying chamber, provided with a stove and hot-air tubes on each side to dry the batting as it descends, a grating on each side to protect it from contact with the tubes and stoves, and a folding box at the bottom, into which the batting is folded from one side to the other as it descends. By this arrangement I dispense with the endless belts heretofore employed in sizing and drying batting, which are soon destroyed by the great heat to which they are exposed in passing through the drying chamber, and which are, of course, very expensive; and at the same time I avoid the contact of the batting after it has been sized, and before being dried. I am aware that it has been essayed to dispense with the endless belts, by passing the sheets of batting from the sizing rollers over another roller, then down into the drying chamber, down near to the bottom of the chamber, and then up again to another roller at the top, the cham-

ber being provided with a stove on each side, and a hot-air tube between the descending and ascending portions of the sheet of batting; but I consider this objectionable, for the reasons that the sizing vats and rollers are so situated, that the sized bat has to pass over a roller before entering the drying chamber; and because, as it is carried down and then up again, in case of breaking it is liable to fall on to the bottom stove, and catch and communicate fire to the whole establishment; and in the event of not catching fire, it becomes necessary for the operative to enter the hot-air chamber, which is heated to a very high temperature, to replace the batting in a condition to continue the operation up; all of which difficulties are obviated by the location of the sizing rollers immediately over the aperture in the top of the furnace, in combination with the arrangement of stoves and pipes, and protecting grates on each side, and the folding box at the bottom."

"I do not claim as my invention conducting the bat from the sizing rollers to the drying chambers without a belt; but what I do claim as my invention, and desire to secure by letters patent, is the arrangement of the vatch of the sizing rollers immediately over the aperture in the top of the drying chamber, in combination with the arrangement of stoves and pipes and protecting grates on each side of the chambers, and the folding box at the bottom, for the purpose and in the manner described."

The following is the third mode above alluded to, and is extracted in the words of the inventor:

"The methods heretofore practised of making the bat of the desired thickness for wadding, are, to deliver the broad sliver, or sheet of cotton, from one carding engine into an apron, which moves back and forth until a sufficient number of layers have been obtained; or so to construct the engine as to deliver a single sliver, or sheet of the required thickness, or to carry up the slivers from the carding engines vertically, so arranged as to unite them all into one bat. The defects of these methods are obvious; for, with the first, the sheet of wadding must either be made very short, or be spliced end to end, (a very imperfect operation;) with the second, the reciprocating apron, on which it is delivered, must be of an enormous length, occupying an amount of room too great for the convenience of an establishment; and with the third, the slivers, which are drawn up over head, frequently break. The arrangement of belts must necessarily be very complex; and from their situation the slivers are much exposed to fire; and, indeed, from the number of accidents which have occurred, none of the establishments which manufacture cotton wadding can be insured. The object of the first part of my invention is to avoid these objections and inconveniences; and it consists in ranging a series of carding engines one behind another, over an apron which has a continuous movement, so that the sliver, or sheet of cotton, from the second card, is delivered on top of that from the first, the one from the third on to that of the second, and so on to the end of the series, the number of carding engines being in proportion to the quality and thickness of the bat or wadding desired; it being a fact well known to those versed in the art of working fibrous materials, that the thinner each sliver the more perfect will be the bat; and it will be evident that, with my method, this can be refined to any desired extent.

"As to the glazing operation, but one method has been practised, (although several have been proposed and patented,) which consist in conducting the bat on an endless apron to a vat, where it is glazed on one side, and then conducted to a second vat to be glazed on the other side, and from this delivered on to another endless apron, which passes through a kiln, or hot-air chamber, to be dried. This method is not only very imperfect, but attended with great expense and danger, for that face of the bat which rests on the apron is not exposed to the direct action of the heated air, and therefore dries slowly; which fact renders it necessary to raise the temperature of the kiln and hot-air chamber, which very soon destroys the apron, and often subjects the whole establishment to loss by fire. The second part of my invention, it is believed, obviates all these objections, and consists in passing the glazed bat, or wadding, from the glazing apparatus, through the kiln, or hot-air chamber, over a series of open reels, arranged side by side on one plane, and extending from end to end of the kiln, one reel delivering the bat on to another, and so on to the end of the series, where it is delivered out. If the bat is glazed on both sides before it is introduced into the kiln, but one set of reels is used; but I prefer to glaze it first on one side, dry this by passing it through the kiln on one set of reels, and deliver it at the other end to the second glazing apparatus, to be glazed on the other side, and then passed through the kiln on another set of reels above the first. In this way I avoid the inconvenience of accumulating the glazing or sizing on the rods of the reel; for, in passing through the first time the unglazed surface rests on the bars of the reel, and the second time the side first glazed; in this way I avoid what otherwise would be a serious inconvenience."

"It will be obvious that the first of my invention is applicable to various operations in the manufacture of fibrous and textile substances, such as making bats of wool, and other animal fibres for felting, and all other operations in which it is necessary to form a bat of several thicknesses of sliver, of the width of the doffer of a carding engine; and it will be equally obvious that the second part of my invention is also applicable to all operations in manufactures which require fragile webs or tissues to be conducted from sizing or glazing apparatus, to be exposed to the action of the heat or currents of air."

The following is the last process for glazing cotton batting which has come to my notice, and is in the words of the inventor:

"Pelisse, or cotton wadding, which consists of delicate fibres of cotton connected together, and made into a bat by the operation of the carding engine, has heretofore been glazed on the two surfaces, by passing first one and then the other surface in contact with rollers or belts covered with the glazing matter, as it was supposed that this could only be effected by moving the surface of the bat in contact with a glazed surface. This necessarily requires two operations to glaze the two surfaces, and leaves the edges only partially covered, or glazed, and consequently ragged, and liable to fray out.

"My improved process avoids all these difficulties, and renders the operation much more rapid. It consists in passing the batting, or bat, into and through the glazing matter, and at a velocity so great as to simply cover the entire surface, including the edges, and prevent the glazing matter from penetrating to the inner fibres.

"The manner in which I have applied my improved process is simply to pass the batting at a velocity of about thirty-six feet per minute, into and through the glazing matter, and under a roller near the bottom of the vat, and thence out, so that the batting shall pass through the glazing matter in passing to and from the roller.

"I wish it to be distinctly understood that I do not lay claim to this apparatus as it has been employed for saturating with tar, and other similar substances, batting made of hempen and other coarse fibres, employed in sheathing vessels, &c., the object being thoroughly to saturate the fibres to cause them to adhere to each other and to the cementing matter, with the view to form, as near as practicable, a water-proof fabric, the object and the fabric being entirely different from cotton or pelisse wadding; but what I do claim as my invention in the process of glazing the fabric known under the general appellation of pelisse, or cotton wadding, is passing it through the

glazing liquid at a velocity substantially such as herein described, so as to cover the entire surface and edges, without penetrating to the inner fibres, as described."—*Burke's Report, pp. 57–60.*

LEGAL INTELLIGENCE.

KNIGHT *v.* GAVIT.

In the Circuit Court of the United States, for the Eastern District of Pennsylvania, October session, 1846.

INFRINGEMENT.

R. B. KNIGHT, JNO. CADWALADER, WM. M. MEREDITH, and GEO. M. DALLAS, Esqs., for the plaintiff.

H. HOPKINS and H. J. WILLIAMS, Esqs., for the defendant.

THIS was an action to recover damages for a violation of the letters patent issued on the 25th of September, 1839, to William and Abijah L. Knight, and Edward F. Condit, for "a new and useful improvement in the machine for making paper;" and suit brought by Abijah L. Knight, original proprietor of one-third of the patent, and assignee of the two-thirds formerly of William Knight and Edward F. Condit, respectively. The assignment by Condit to the plaintiff was admitted to have been duly recorded. The assignment by William Knight was of subsequent date, and was a general one, of all his property, in trust for the benefit of his creditors. The third part of the patent thus assigned, having been valued at a small sum by appraisers appointed according to the laws of Pennsylvania, the assignee had taken it at the appraised value; and in an account filed in the office of the proper court, but not finally settled, had credited the estate with the amount of the valuation, as "proceeds of sale" of the estate of the assignor. The assignment of William Knight to Abijah L. Knight, though duly recorded at Philadelphia, according to the local law of Pennsylvania, and recorded in the Patent Office before suit brought, was not recorded in the Patent Office within the time of three months, prescribed by the patent law.*

In the specification, the patentees, after stating that they had "invented certain improvements in the machine for manufacturing paper," describe a revolving cylinder, or *wet machine*, with its appurtenances; after describing which, and its mode of operation, there is a description of the pressure of the pulp, between ordinary pressing rollers, guarded by felt; on leaving which rollers, the paper and the felt are said to separate, the former passing alone towards the drying cylinders. The material parts of the specification then follow in these words:

"We usually employ ten drying cylinders, placed in pairs, one above the other; and, although we consider these as sufficient for all useful purposes, we do not intend to confine or limit ourselves to this number: they are marked T, T, T, in the drawing; they are about twelve inches in diameter, usually of iron or copper, turned perfectly true upon their surfaces; they are hollow, and have hollow journals for the introduction and discharge of steam, and are in fact *made in all respects like the drying cylinders in other paper machines*, their difference consisting of their being made of a smaller size than ordinary, and in their being *used in pairs, one above another*, so that they may *press as well as dry the paper;* these journals may work between uprights *p, p;* and the upper may be pressed upon the lower roller *with any desired degree of force* by means of the weighted levers Z, Z, Z. The upper rollers are without gearing, and are made to revolve by the motion of the lower rollers; these latter are geared together by means of spur wheels on their axis, and intermediate spur wheels *x, x, x*. The cylinders thus constructed will press closely throughout their whole extent, but *they may be made to work at any desired distance from each other by placing hoops or bands of a determined thickness on each end of one of the pairs of rollers;* to each pair of drying cylinders there is a pair of guide cylinders *u, u*, the journals of which have their bearings in the frame work of the apparatus; their peripheries stand as near to the drying cylinders as can be admitted; between them and the upper drying cylinders there should be just sufficient space for the naked paper to pass on its return from the lower cylinders over the upper one. Nos. 9, 9, 9, represent an endless woolen apron or cloth, upon which the continuous sheet of paper O, O, represented by dotted lines, is received as it arrives from the paper cylinder A, A, to be acted upon by the drying apparatus. Upon the apron the paper is received at *u*, over which cylinder the paper and cloth pass together, thence *around and under the first lower drying cylinder;* but when the two arrive at the second small cylinder u^2, they separate, *the paper passing alone under and around the first upper drying cylinder*, as shown by the dotted lines, whilst the apron passes on to the third small cylinder u^3, the paper being again received upon it as it passes the holding roller *y*, which serves to hold or keep the paper in contact with the upper drying cylinder, and to conduct it on to the apron. *In this manner the paper passes along the whole series of drying cylinders*, and when delivered from the last, is wound on the reels 3 or 5 placed on the ends of levers 6, precisely as in many other paper machines, there not being anything new in this part."

"*On the drying cylinders now in use the cylinders or driers work separately, not in pairs, nor in contact with each other;* in consequence of which, they consume more steam than our cylinders, and the paper made by them is less smooth than that which is pressed between heated cylinders, as in our machine. The number of drying cylinders most commonly used in other machines is five, and these are ordinarily from two to three feet in diameter; in these, there can be but five different degrees of temperature, subjecting the paper frequently to too sudden a transition, causing the paper to cockle or wrinkle. In our apparatus we have ten cylinders; a *successive graduation of temperature* to that extent may be obtained, without its being necessary to furnish a larger drying surface than on the ordinary five cylinders. * * Having thus fully described the manner of constructing our machine, and also explained the manner in which the same operates, we do hereby declare that *we do not claim as of our invention either of the individual parts of the machine taken separately, but do claim to have combined and arranged these parts with each other, and so to have proportioned them as to have produced new and useful results.*

* * "We claim the *arrangement of the drying cylinders in a number of successive pairs*, for the purpose of simultaneously drying and pressing the paper, *as herein described.*"

The drawing referred to in the specification annexed to their patent, (see fig. 1,) was inscribed with the words "Drawn on a scale of 1½ inches to the foot, May, 1839;" and their application for the patent appeared to have been filed in the Patent Office, with the drawing and model, on the 18th June, 1839. There was testimony referring the date of the invention to the previous year, so far as the maturity of its original mental conception was involved.

The drawing (fig. 2) is of a machine of four pairs of cylinders, now in use in Gabriel Moore's manufactory, constructed conformably to the specification, without its apparatus of cog-wheels and levers, the parts of the machine successively in contact with the paper being alone presented to view.

The plaintiff proved the ordinary price at which a set of his patented driers, comprising four pairs of cylinders, had been sold, and the average rate of his profit on a machine. He produced numerous witnesses, who testified as to the utility and originality of his invention. It appeared that the machine constructed by him was of less cost and more economical operation than machines previously in use, and that it made paper of more solid texture and more equal smoothness of surface on each side than former machines. Its particular utility was for manufacturing printing paper for newspapers and books. The quality of cheap paper for these purposes had undergone great and general improvement since its introduction; so much so, that those who did not use the machine had been compelled to subject the dried paper to repetitions of the calendering process previously in use, with augmented pressure, and to resort to involving an increase of expenditure. It also appeared that printing paper made by the patent machines was ordinarily distinguishable by inspection, and by touch, and was for most purposes preferred in the market to printing paper otherwise made. Machinists, paper makers, and paper dealers, concurred in testifying to the merits of the improvement of the patentees, on the ground of originality as well as utility. Under the head of originality numerous persons of skill and experience from different parts of the Union deposed that nothing of the sort had, to their knowledge, before been used berore the patent, and there was testimony of similar testimony as to foreign parts. The superiority of machines constructed upon the plan of the patent was proved to have been admitted in various ways

* According to decisions in the first circuit, this point is immaterial, even at law; the assignment having been recorded before suit brought.—2 *Story Rep.*, 609, 525.

FIG. 1.—DRAWING ANNEXED TO THE SPECIFICATION OF PLAINTIFF'S PATENT.

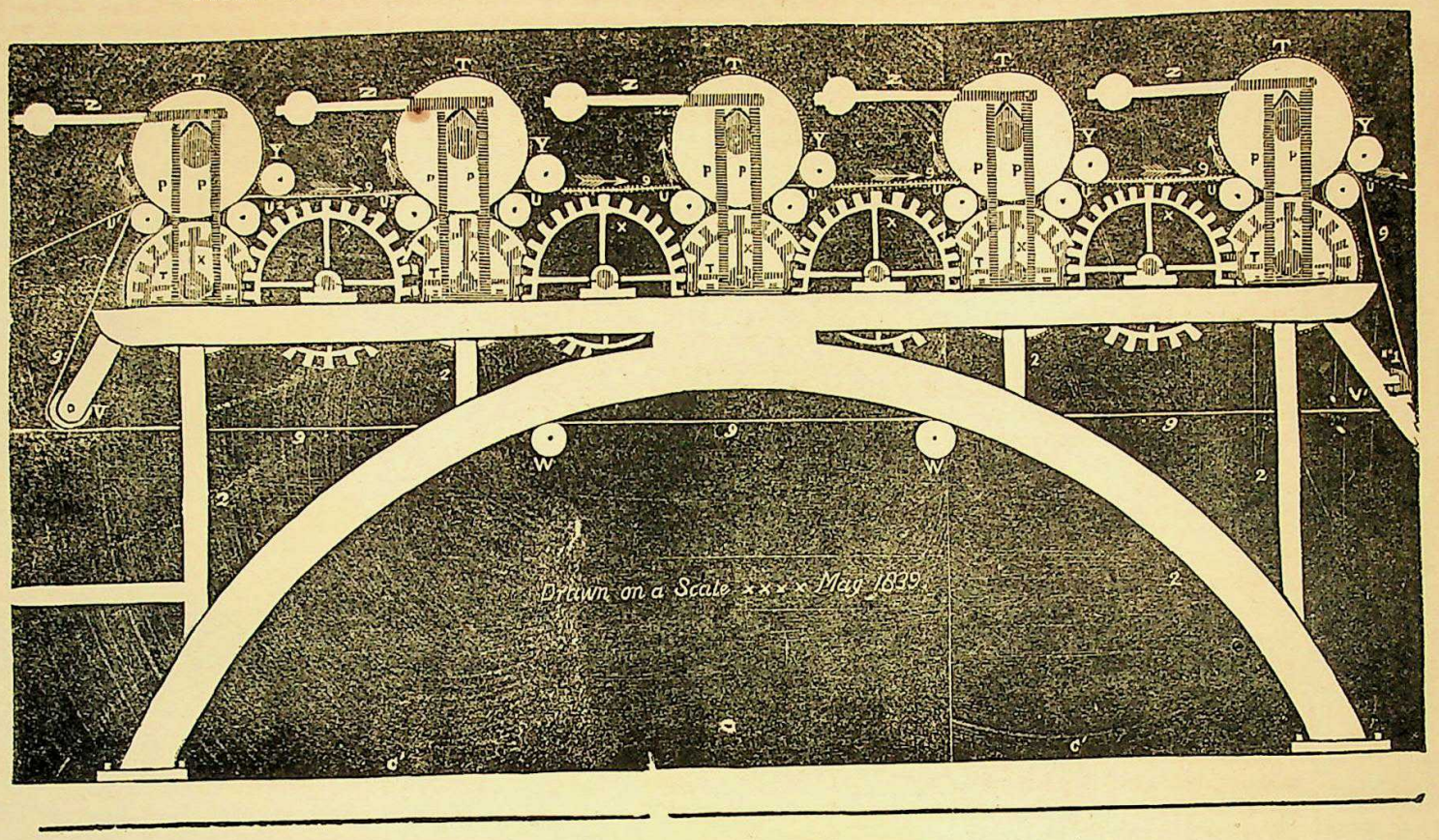
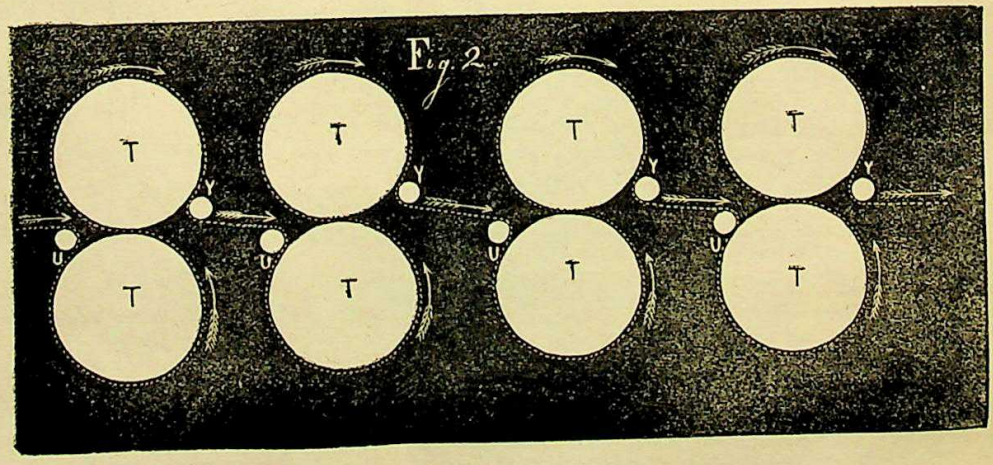
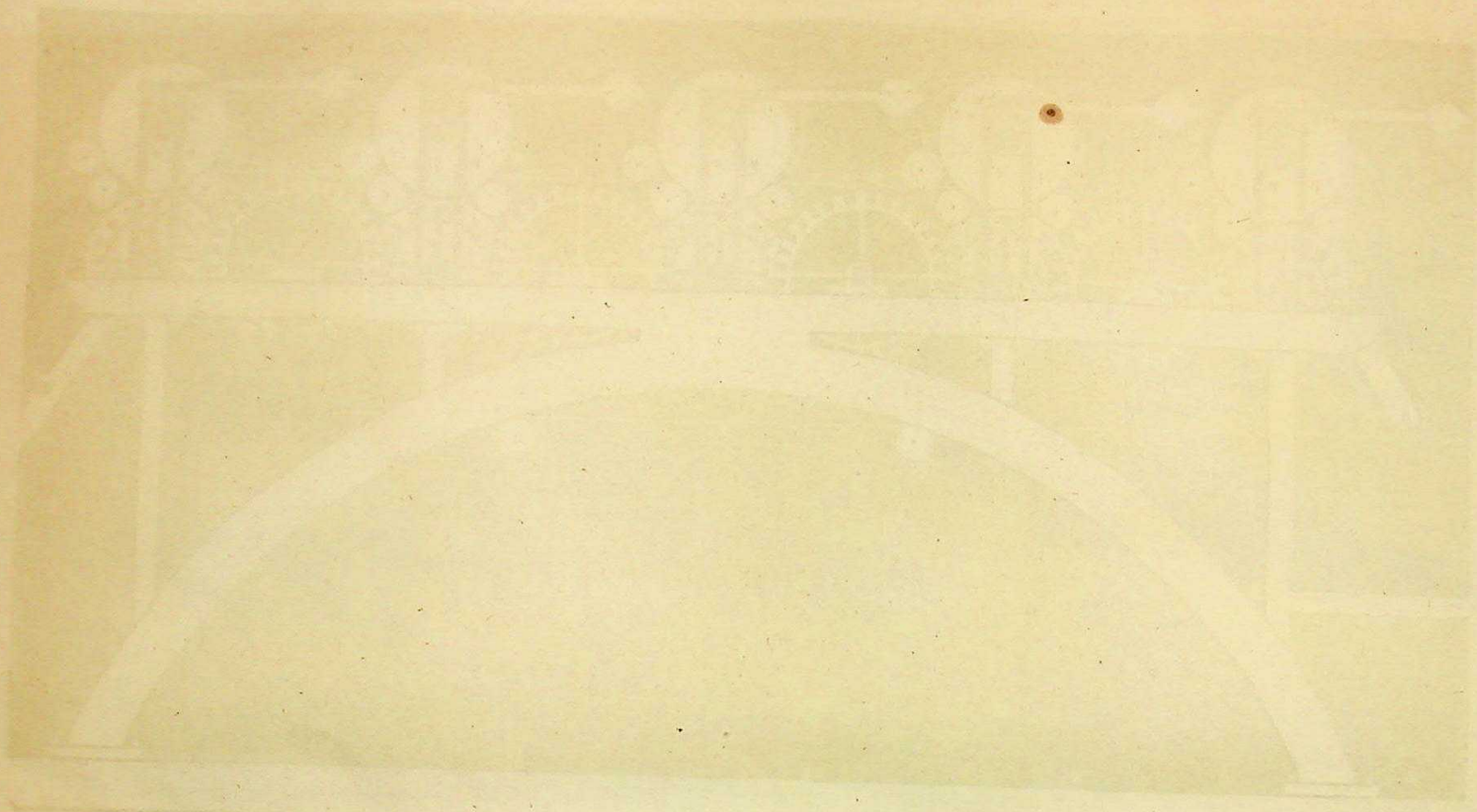
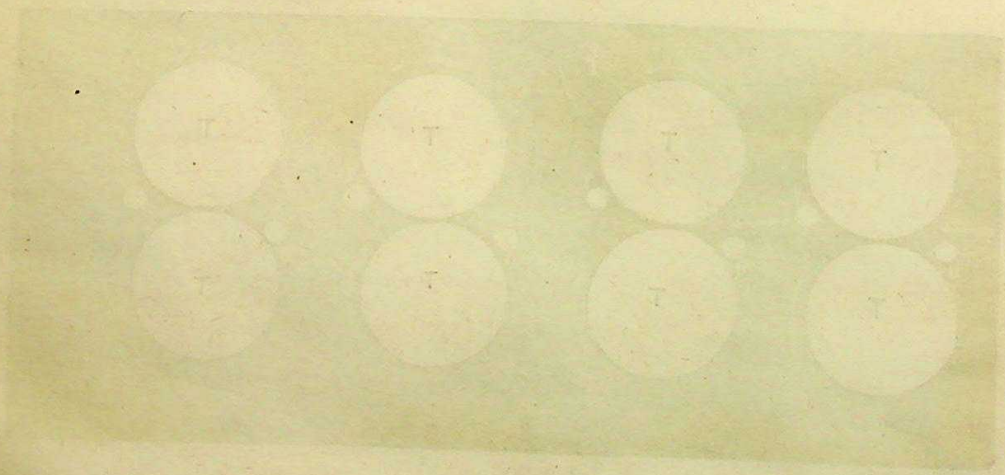


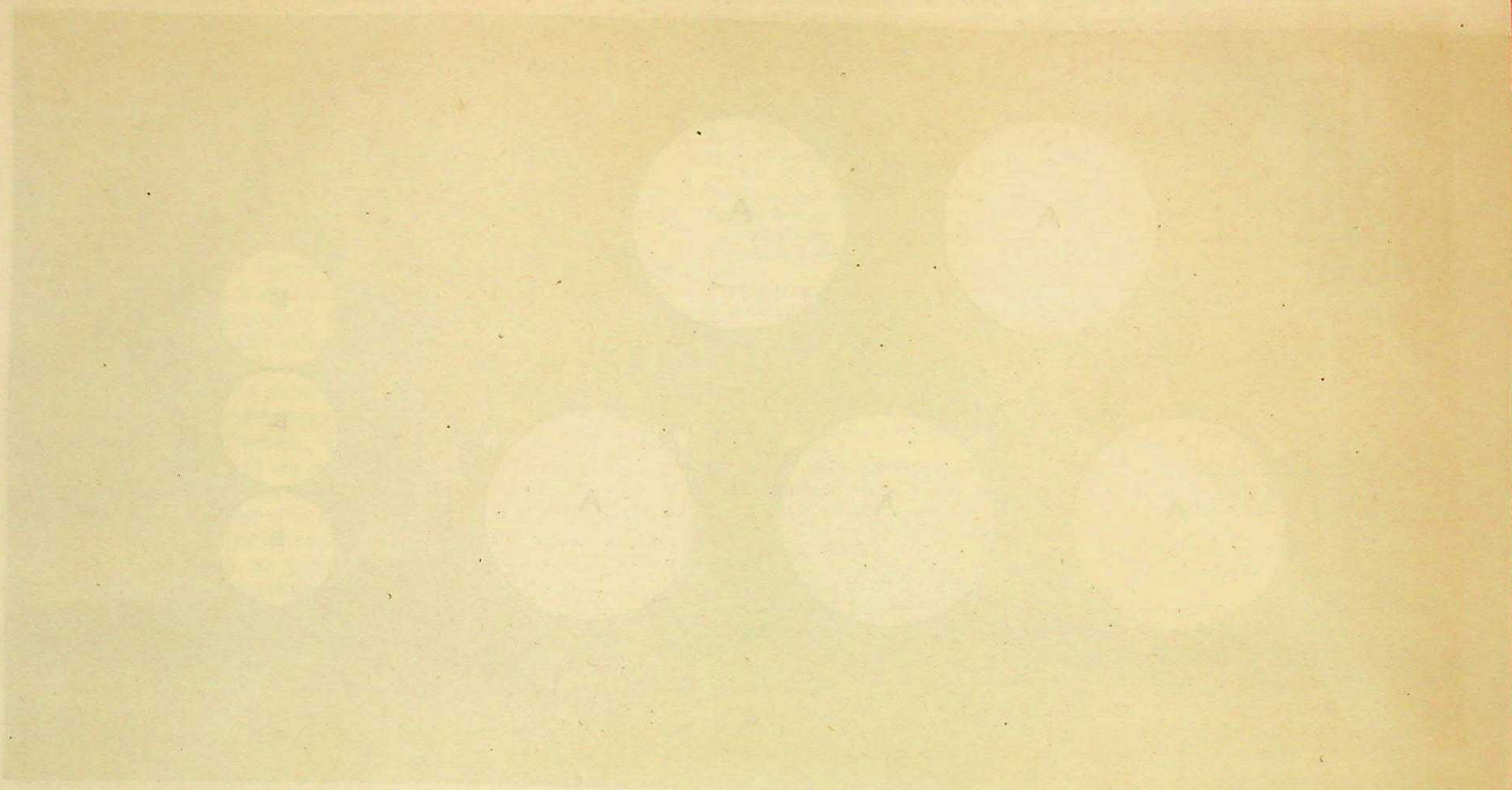
FIG. 2.—MOORE'S MACHINE, MADE BY PLAINTIFF.



The lettering, &c., is conformable to that in the specification of the patent, p. 94.



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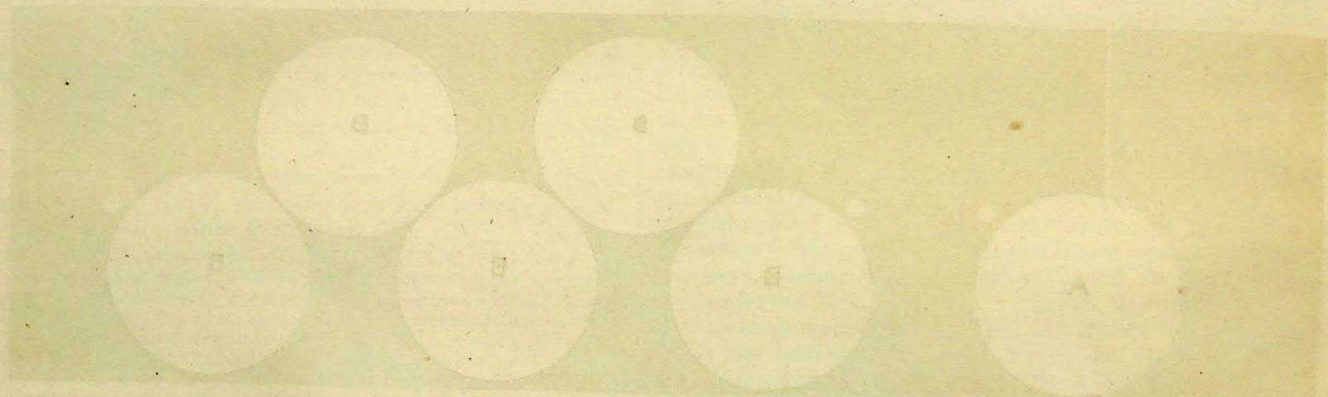
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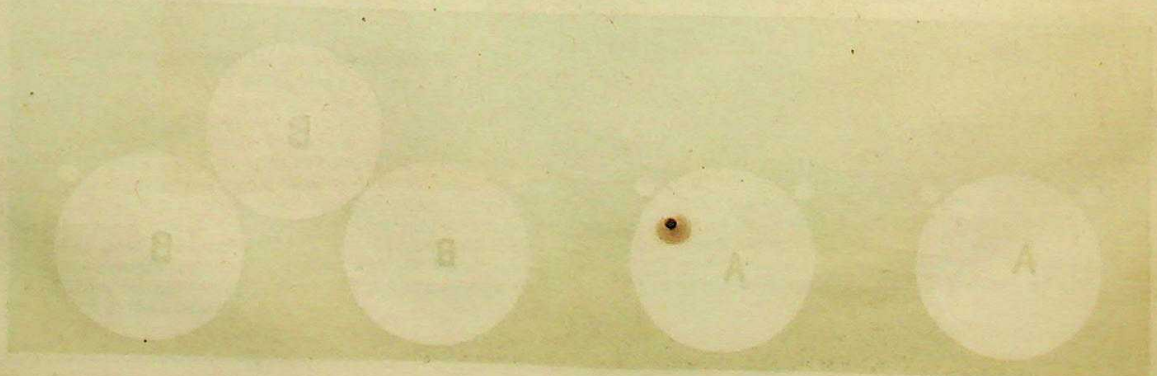
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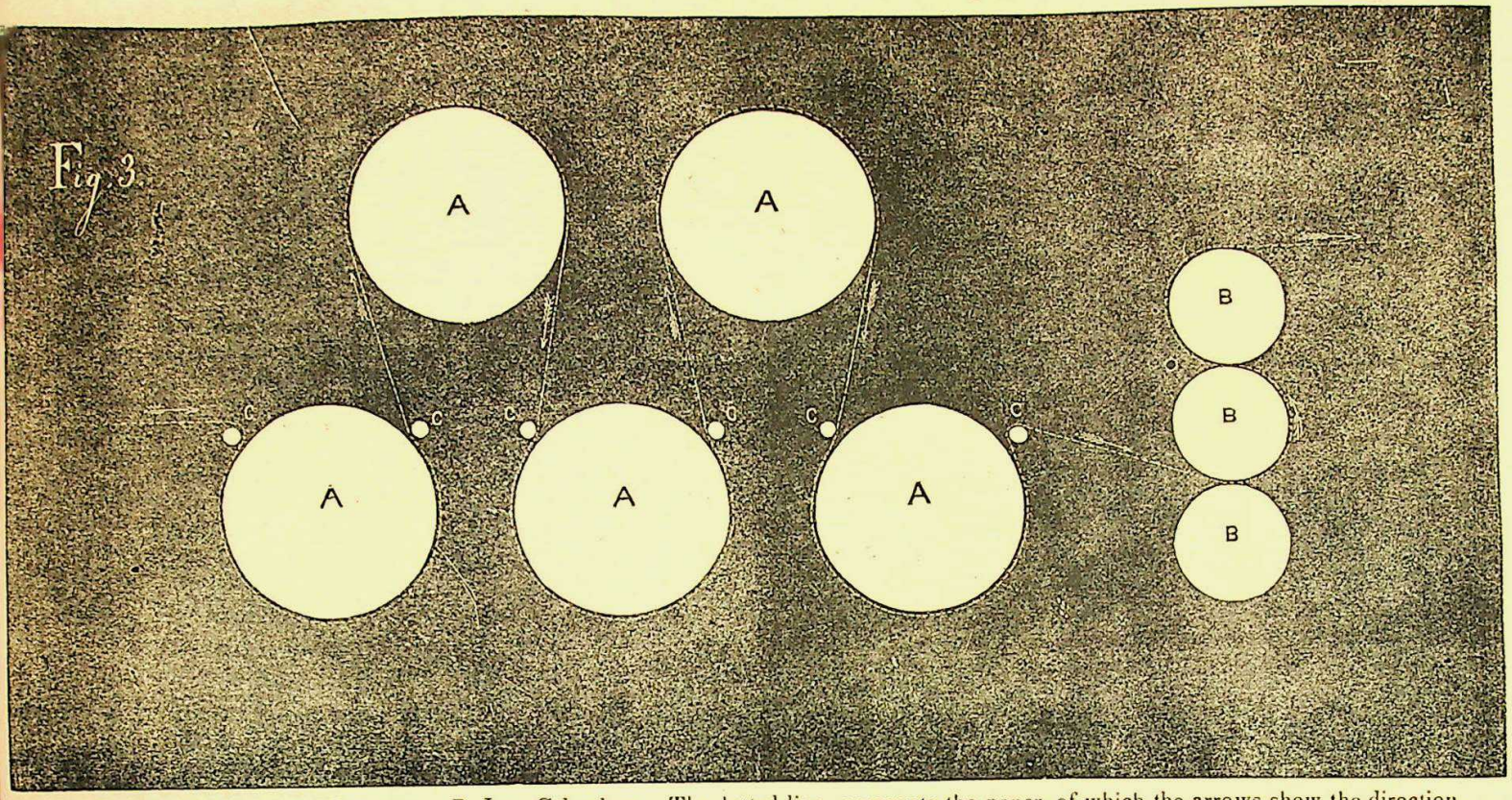
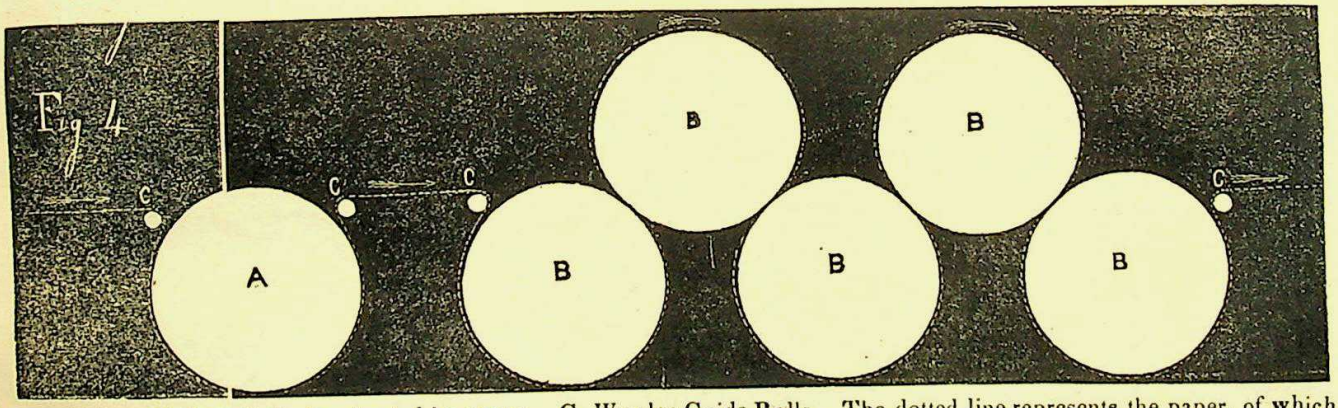
FIG. 3.—PHELPS & SPAFFORD'S DRIERS AND CALENDERS.



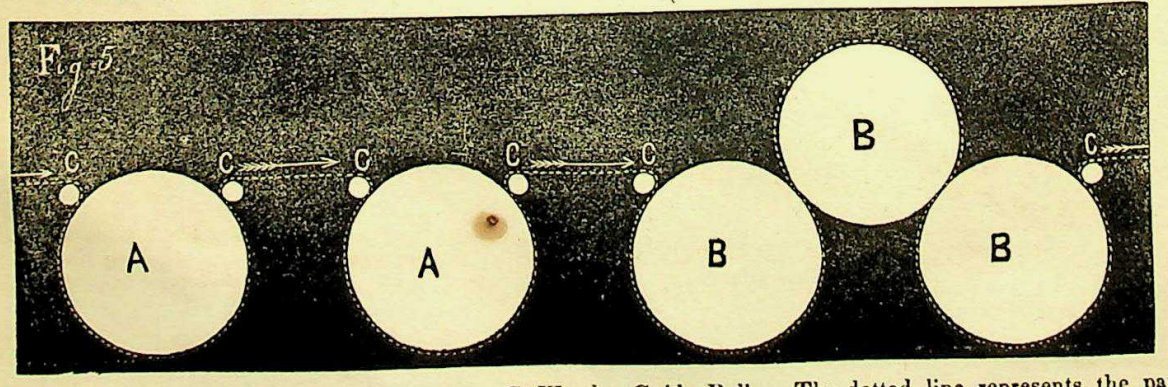
A. Metallic Driers, heated by steam. B. Iron Calenders. The dotted line represents the paper, of which the arrows show the direction.

FIG. 4.—WILCOX'S MACHINE, A. D. 1844.



A. Copper Drier. B. Iron Cylinders, heated by steam. C. Wooden Guide Rolls. The dotted line represents the paper, of which the direction is indicated by the arrows.

FIG. 5.—WILCOX'S MACHINE, DECEMBER, 1842. (*Being the infringement complained of.*)



A. Copper Driers. B. Iron Cylinders, heated by steam. C. Wooden Guide Rolls. The dotted line represents the paper, of which the direction is shown by the arrows.

by the same persons, in whose favor the merit of previous invention was asserted on behalf of the defendant.

The defendant, who is a machinist, had, until after the plaintiff's patent, sought employment as a maker of driers, upon a plan of construction which he had recommended as the best and most approved, and according to which plan he had constructed many, and set them up. Driers of this construction and operation had previously been in ordinary use in various parts of the United States. They had been circulated extensively by Phelps and Spafford, by whose name they were often designated. They were generally used in connection with a pair, or more, of cold calenders, between which the paper, after it had been dried, underwent hard pressure. The drawing, Fig. 3, (see plate annexed,) exhibits the use and adaptation of these former driers and calenders.

After the plaintiff's patent was granted, the defendant published an invitation to paper makers to purchase his (the defendant's) "*improved* driers," the mode of construction and intended operation of which, as verbally explained by him, and practically carried into effect, is represented in the drawing, Fig. 4, (see plate annexed.) The particular infringement of the patent complained of in this action, consisted in the making and putting up by the defendant, for James M. Wilcox & Son, of a machine, which, as finally constructed, was similar to that of which the same drawing (Fig. 4) is a representation. But the last two cylinders were not constructed until after the bringing of this action, and were not directly proved to have been a part of the original plan of the machine. The matter in controversy was, therefore, the construction and sale by the defendant of three iron cylinders, of which the upper was brought into contact with the two lower ones. Messrs. Wilcox had previously owned and used a set of Phelps and Spafford's driers, consisting of five copper cylinders arranged as above, Fig. 3, (see plate annexed.) The three last of these were removed and discarded. In place of them the defendant supplied Messrs. Wilcox with these three iron ones. They retained in use, in connection with them, two of the copper driers of the old machine of Phelps & Spafford, upon which the paper was, in the first instance "partly dried, *so that it would not crush or sqush*" by the pressure of the cylinders which were in contact with one another. The operation of the machine, as thus used, is represented in the drawing, Fig. 5, (see plate annexed.)

As a compliance with the requisitions of the 15th section of the Patent Law of 1836, the defendant had, before the trial, given the following notice to the plaintiff:

KNIGHT v. GAVIT.—C. C. of U. S., October Sess. '43.—No. 9.

SIR: Take notice that, in addition to the evidence legally admissible under the pleas in this case, the defendant will give the following special matter in evidence, viz: That drying cylinders, arranged in successive pairs, for the purpose of simultaneously drying and pressing the paper, a patent for which is claimed by plaintiff, was known to, and in use by many paper makers, long before the date of the plaintiff's patent. Amongst those to whom it was known, and who, he intends to prove, made use of them, he names Messrs. Hines & Newman,* who resided at Brattleboro, in the State of Vermont, where they made use of cylinders similarly arranged, for some years before the date of the plaintiff's patent.

Henry P. Howe, who resides at Worcester, Massachusetts, first used similar cylinders, similarly arranged, in 1828, and has continued to use them since.

That Joseph C. Carter, residing at Cecil Paper Mills, near Elkton, Maryland, made and used similar cylinders, similarly arranged, in the year 1836, and has continued to use them.

That Archibald Robertson, residing at Brighton, Pennsylvania, made, built, and put in operation, drying cylinders of similar construction, some months before plaintiff's patent.

That similar cylinders, for similar purposes, were made by William Sheetz, at Indianapolis, and near Madison, Indiana, before plaintiff's patent.

That D. & J. Ames, of Springfield, Massachusetts, used at their factory there, cylinders, viz: drying cylinders, to dry and polish paper, so arranged as to produce the result which is claimed by the arrangement of the cylinders in plaintiff's patent. They so used them long before plaintiff's patent.

A. & R. Fisher, residence, Wheeling, Virginia.

James Howard & Co.,* residence, Pittsburg, Pennsylvania.

J. McCoy & Co.,† residence, New London Cross Roads, Chester co., Pennsylvania.

That at the paper mills of each of those persons, cylinders upon each other, arranged so as to dry and polish the paper at the same time, and producing the same results as claimed for the arrangement patented by plaintiff, have been used for years before plaintiff's patent.

That the whole, or great part of the whole, matter of arrangement, combination, or discovery, claimed by the plaintiff in his patent, has been in use by some or all of the above named persons.

All of which the defendant expects and intends to prove on the trial of this case.

Your obedient servant.

The defendant relied on four of the machines mentioned in this notice, which he contended had been made and used before the plaintiff's patent, in a manner and to an extent which deprived the patentees of the merit of originality. These were the machines of Ames, Carter, Fisher, and Howe, respectively.

Between forty and fifty witnesses were examined. After the evidence was closed, the plaintiff contended that the specification showed that his patent was for *a machine to finish paper by the repeated contact of heated metallic cylinders, acting with graduated temperature and pressure on the naked sheet, while damp, in successive stages of the drying process; with an intermediate adaptation of former modes of alternately shifting the side next to the drying surface of the cylinders*; and that on the question of invention, or of infringement, the explanatory designation of a method of graduating or preventing the closeness of contact of the two first cylinders did not exclude the optional use of other modes of postponing or graduating original contact or pressure, as might be deemed best for the protection of the moist sheet against injury from premature or excessive pressure. He therefore requested the court—*First*, to instruct the jury, that, if the terms of art contained in the specification were ordinarily used and applied as testified, and if the jury believed that *the varying texture of the damp sheet during the drying process*, as described by the witnesses, *rendered such repetition of contact of the driers a process adapted to the successive conditions of the sheet, and useful in converting it into finished paper*, in the manner testified, the plaintiff's

* The evidence relating to Hines & Newman was not in the end relied on by the defendant. Elihu H. Thomas, of Brattleboro, deposed, that in 1834 he had made for *John* Sheetz, of Madison, Indiana, a set of driers to operate separately, with a pair of cold calenders to press the paper after it had been dried. Afterwards, in 1838, he supplied Sheetz & Yandes, of Indianapolis, of which firm *William* Sheetz was a member, with a machine, which was made for the witness by Hines & Newman, the persons named in the notice. This was similar to the machine of 1834, except that the cold calenders were placed between the two last driers. Some time after the plaintiff's patent, Mr. Thomas had in like manner supplied Mr. Yandes, of the former firm of Sheetz & Yandes, with a third machine, also constructed by Hines & Newman, consisting of three driers placed horizontally in succession, and apart from each other, above and in contact with each of which driers were small iron calenders, between which and the driers the paper was passed. This machine was constructed in 1840 or 1841. The small calenders were not heated otherwise than as heat may have been imparted from the driers through the paper, and the parts of the machine were not so arranged as to admit of a change of the side of the paper next to the surface of the driers.

Mr. William Sheetz, who had seen the plaintiff's patent driers, testified to the dissimilarity of both the machines of himself at Indianapolis, and John Sheetz, at Madison, Indiana, respectively. The same Mr. Thomas was well acquainted with the business of Hines & Newman, and testified, that until after the plaintiff's patent they never made machines in which the operation of drying and calendering was so combined as to be performed simultaneously.

* The machine of J. Howard & Co. was not in operation until the middle of August, 1839, about two months after the application for the plaintiff's patent, and it was doubted if it had been in operation so soon. It was like that of Messrs. Fisher, with the addition of a cold roll, or calender, placed on the top of the large drying cylinder.

† There was no testimony as to J. McCoy & Co. But, from a drawing in court, it would seem that they had at one time used a single calender roll, of very small size, in contact with a large fire drier like that patented by Howe in 1836, with no attempt at graduation of either pressure or heat.

interpretation of the specification was correct in point of law, and his patent valid, if original.

Upon the question of originality, he insisted that, except in regard to the machines designated respectively as Carter's, Howe's, and Fisher's, and Ames's, there was no testimony opposed to his title as an inventor, and asked the court's direction. *Secondly*, that if the machine designated as Carter's, (Fig. 7,) Howe's, Fig. 9,) and Fisher's, (Fig. 8,) respectively, operated as had been testified, without such successive graduation of either heat or pressure, neither of these machines was identical with the subject of the plaintiff's patent. And—*Thirdly*, that if the machine designated as Ames's (Fig. 6) was constructed, as had been testified, the impossibility of any similar graduation of temperature at the respective stages of dampness of the paper at which the sheet underwent pressure, and the incapacity of the machine to admit of a change of the side next to the drier during the continuance of the process, rendered this a different machine from that which was the subject of the plaintiff's patent. It was also contended in argument, that if, through the failure, or defective execution, of Mr. Ames's purpose of a peculiar adaptation of a press roll, he had been obliged to resort to a remedy, through the use of which he had by accident, and not design, made his machine perform, partially and inappropriately, certain functions to which the plaintiff's machine, as patented, was appropriately designed and effectually adapted; still, as its casual and partial performance of these functions had not caused any public knowledge of the true principles and objects of the plaintiff's machine, and had not even conveyed the true idea of its principle to the mind of Mr. Ames himself, such accidental use of a mode of operation similar in part to that of the plaintiff's machine, ought not to deprive him of the benefit of his patent.

But this point, though insisted on, was not argued at large, as the plaintiff relied confidently on the two radical points of distinction between his machine and that of Ames, on which the instruction of the jury was requested as above.

The defendant's counsel submitted the following points for the Court.

The Court is requested by defendant to charge:

1. That no action can be maintained for the violation of a patent by any persons who are not the owners of the patent, or the exclusive owners of a license for the places where the violation occurred.

2. That the owners of two-thirds of a patent cannot maintain such an action.

3. That if the plaintiff has sold one-third of this patent right formerly owned by William Knight, he cannot maintain this action.

4. That the Narr. states the plaintiff to be the sole owner of this patent; and if he is not so, this action cannot be supported.

5. That the account of the plaintiff, as assignee of his father William Knight, sworn to by the plaintiff, is evidence that he has sold the one-third formerly belonging to said William Knight.

6. That the plaintiff's patent is for a combination only; and as all parts of the machine, separately, were known and used before, the violation must consist in the use of the combination described, and not for making the separate parts of the machine.

7. That making a machine in all respects like the plaintiff's alleged patent, in which the drying cylinders do not touch, is no violation of plaintiff's patent.

8. That making a machine with screws under the journals of the drying cylinders, so as to separate them, is no violation of the plaintiff's patent.

9. That if such a machine be made with screws under the journals by which the drying cylinders may be kept apart, the machinist is not responsible for a violation of the patent right, although the purchaser should lower those screws so as to allow the cylinders to come in contact.

10. That the plaintiff's patent is for drying and pressing simultaneously:

Not for changing the sides of the paper;

Nor for applying pressure at any particular stage of the manufacture;

Nor for applying different degrees of heat.

11. That if drying and pressing paper at the same time was known and used before the patent of William Knight, then his patent is invalid.

12. That a mere repetition or reduplication of a machine known and used cannot be the subject of a patent, merely because the same effect is increased.

13. That if Knight's machine is nothing but the use of two or three of Howe's machines, his patent is invalid.

14. Any use, however limited, of a machine similar in principle to the patented machine, will defeat the patent.

15. The specification which describes only known and previously used parts of a machine will not support a patent for a combination, unless the combination intended to be patented is clearly stated.

16. In Knight's patent the only combination stated is for drying and pressing simultaneously, and therefore that is all the patent covers.

17. If a machine such as Mr. Knight's, or a combination such as he asserts he has patented, is described in the specification of a previous American patent, Mr. Knight's patent is invalid.

18. Ceasing to use a machine, or preferring the use of another machine, will not authorize another person to take out a patent therefor, although he should be a subsequent inventor thereof.

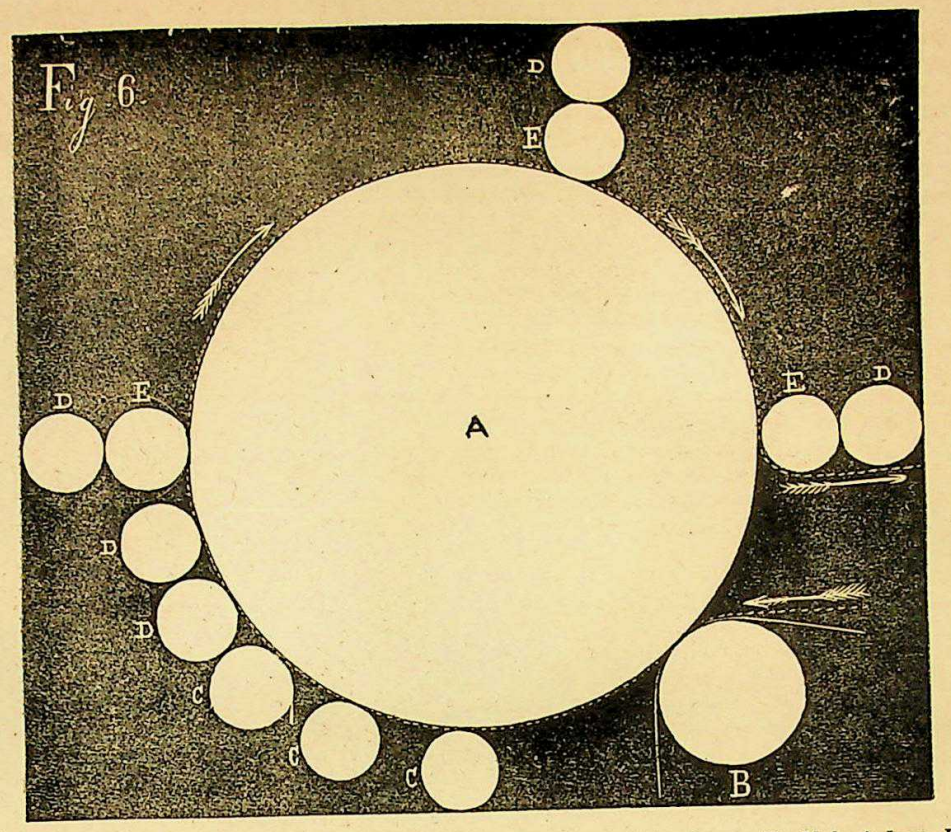
19. If the patentee claims all the machine described in his patent as his combination he claims too much, and upon that ground *this action* cannot be supported.

20. Damages are only for the use of machine proved, so long as it has been proved to be used.

AMES'S MACHINE.

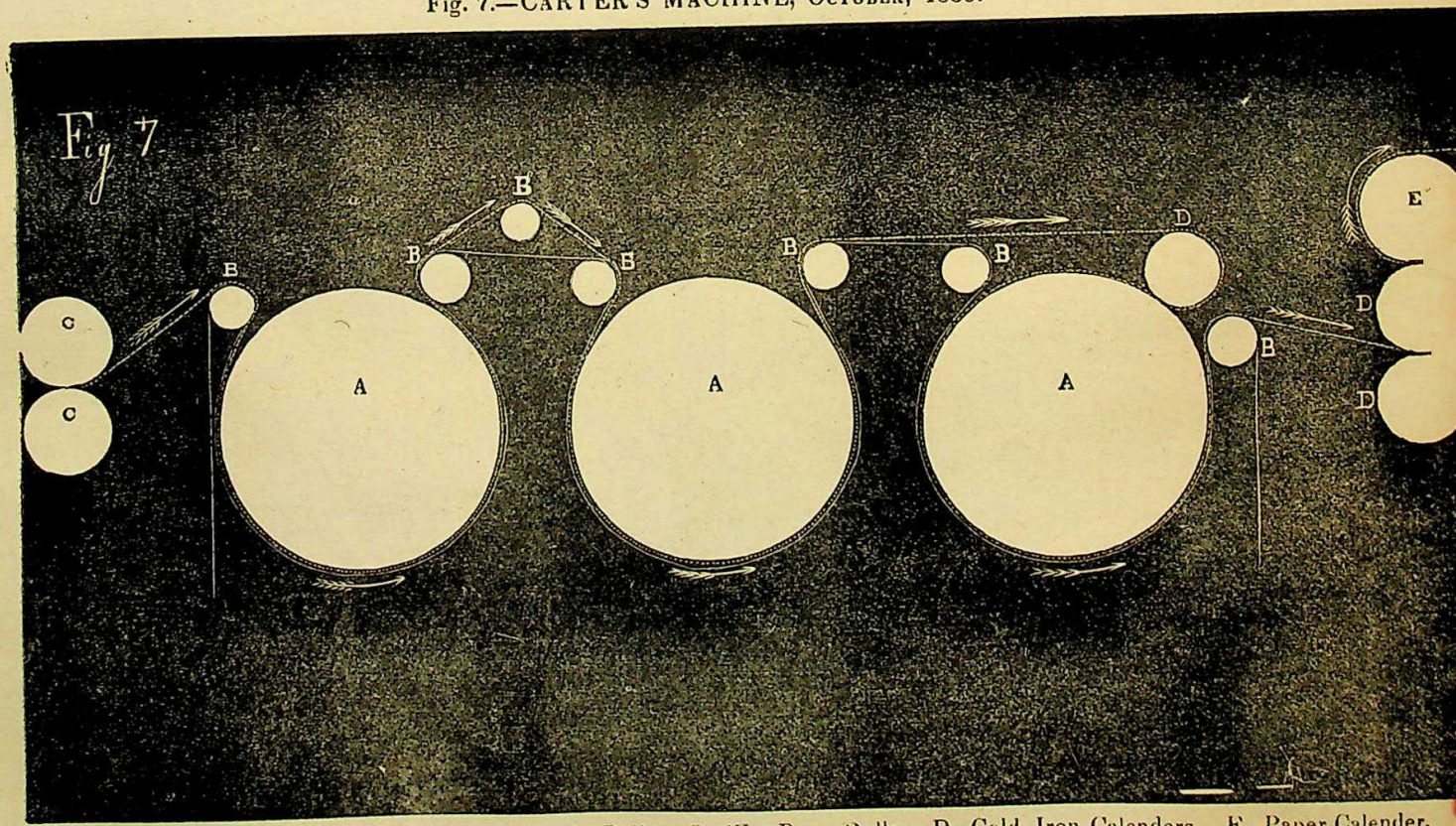
In the year 1835, Mr. Ames patented as an "improvement in the machinery for making paper from pulp," an adaptation of a single hollow metallic cylinder of large size, heated by steam, to the double purpose of an upper press roll of the pulp from the wet machine, and a subsequent drier of the paper. The lower press roll of wood was forced upward against the metallic drying cylinder, the felt being in contact with this wooden roll, below, and the pulp with the surface of the revolving drier. The specification contained these words: "In all the machines for making paper from pulp in use, the paper, after being taken from the wire web mould, or cylinder, by the felting, is carried upon said felting between pressing rollers, and is pressed in passing between the said pressing rollers, and is afterwards *dried on separate drying cylinders*, or in various other ways. My improvement consists in combining the drying machine with the paper machine, so that the paper may be dried *without being removed from the machine, or otherwise handled as has been heretofore done.*" The witnesses mentioned two practical objections to this machine as it had originally been intended to operate. One, that the constant flow of cold water from felt and pulp against the surface of the drier, rendered the process of adequately heating it more expensive than in ordinary machines. The other objection was the unusual degree of difference in the comparative smoothness of the two sides of the paper, this difference being caused by the hardness of the pressure of the soft wet pulp against the rough felting, to the extent necessary to press out the water, and make the paper adhere to the drier. In other machines this might have been remedied in part by the use of an intermediate pair of pressing rollers between the wet machine and the drier, and bringing alternate sides of the paper against the felt; but this remedy, which would have been incomplete, could not have been resorted to by Mr. Ames without a departure from the principle claimed in his patent. This remark will explain the motive which induced subsequent alterations of his machine. He made an endeavor to reduce the extent of the evil of this felt mark, by placing a number of small cold iron calenders variously covered at different times, some with woollen, others with canvass, cloth; some with lead, and others without covering; all under, and in contact with, the large cylinder, and pressed upward against the paper, in different parts of the first quarter of the circle of revolution of the large drier, so as to produce contact of these small calenders in the

FIG. 6.—AMES'S MACHINE.

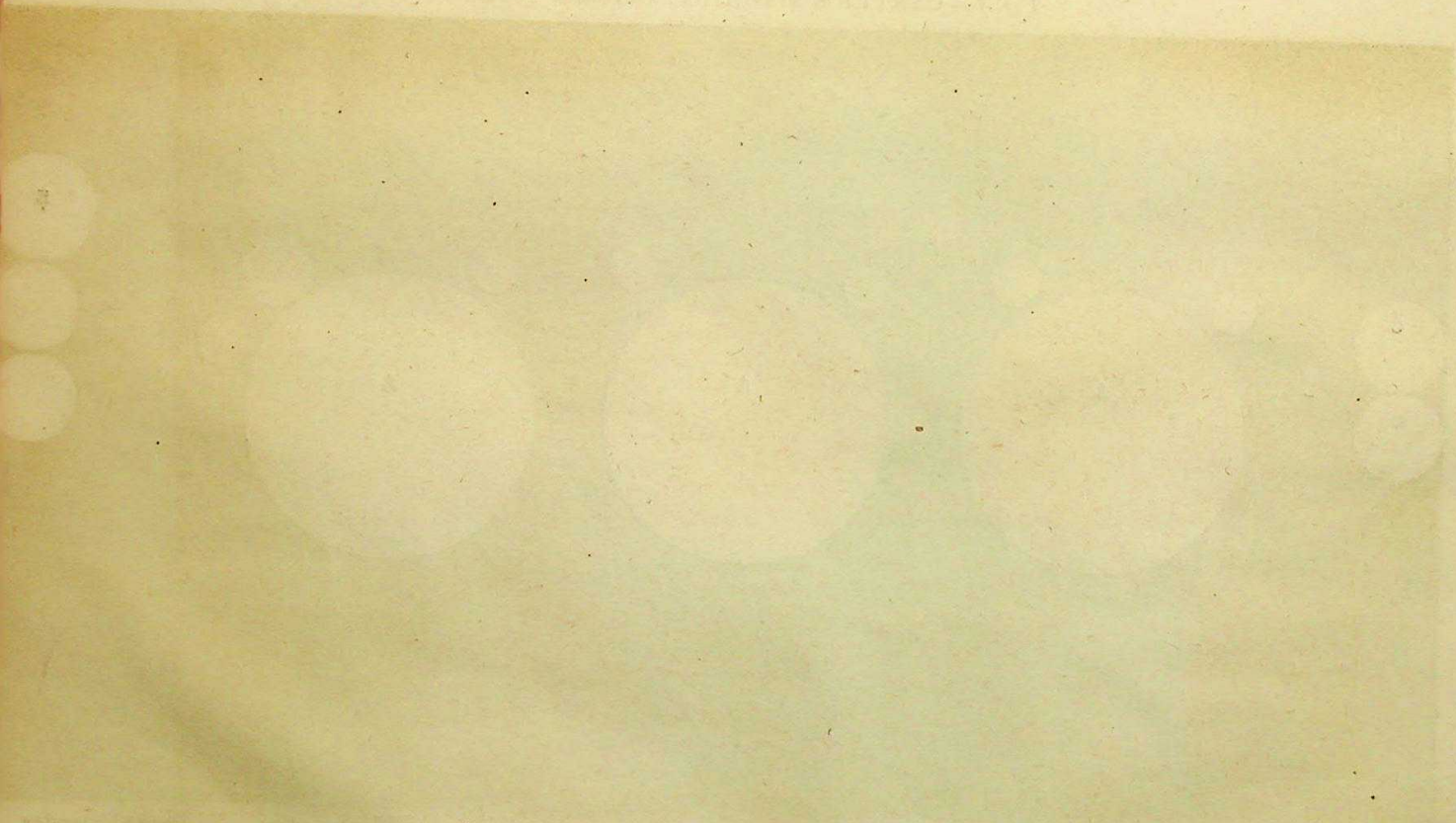


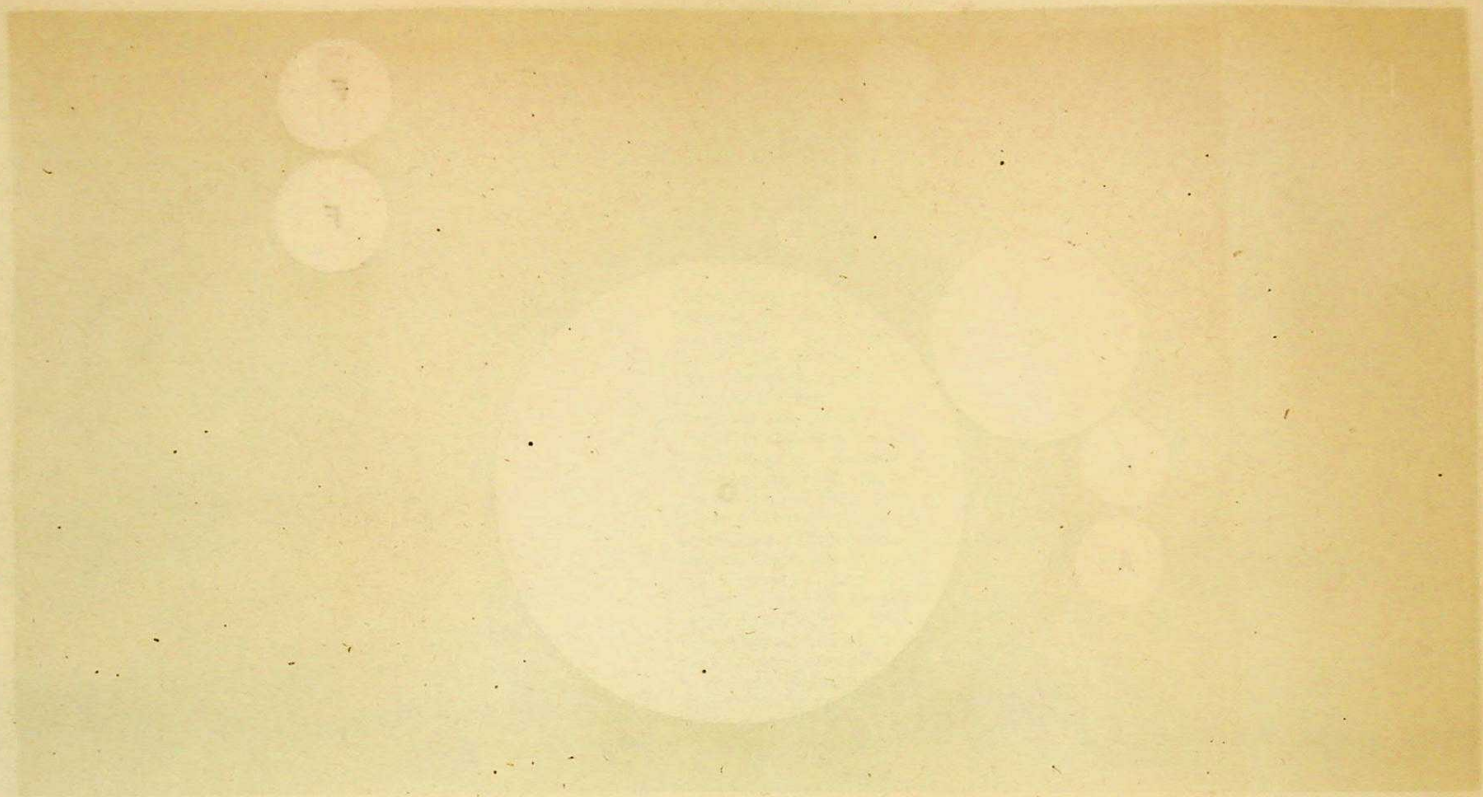
A. Iron Drier, heated by steam. B. Wet Press Roll, wooden. C. Covered Iron Calenders. D. Naked Iron Rolls, or Calenders. F. Paper Calenders. The dotted line represents the paper of which the arrows show the direction. The white line is the felting.

Fig. 7.—CARTER'S MACHINE, OCTOBER, 1838.



A. Iron Driers, heated by steam. B. Wooden Guide Rolls. C. Wet Press Rolls. D. Cold Iron Calenders. E. Paper Calender, (see page 94, note *. The white line represents the felt; the dotted line the paper, of which the arrows show the direction.





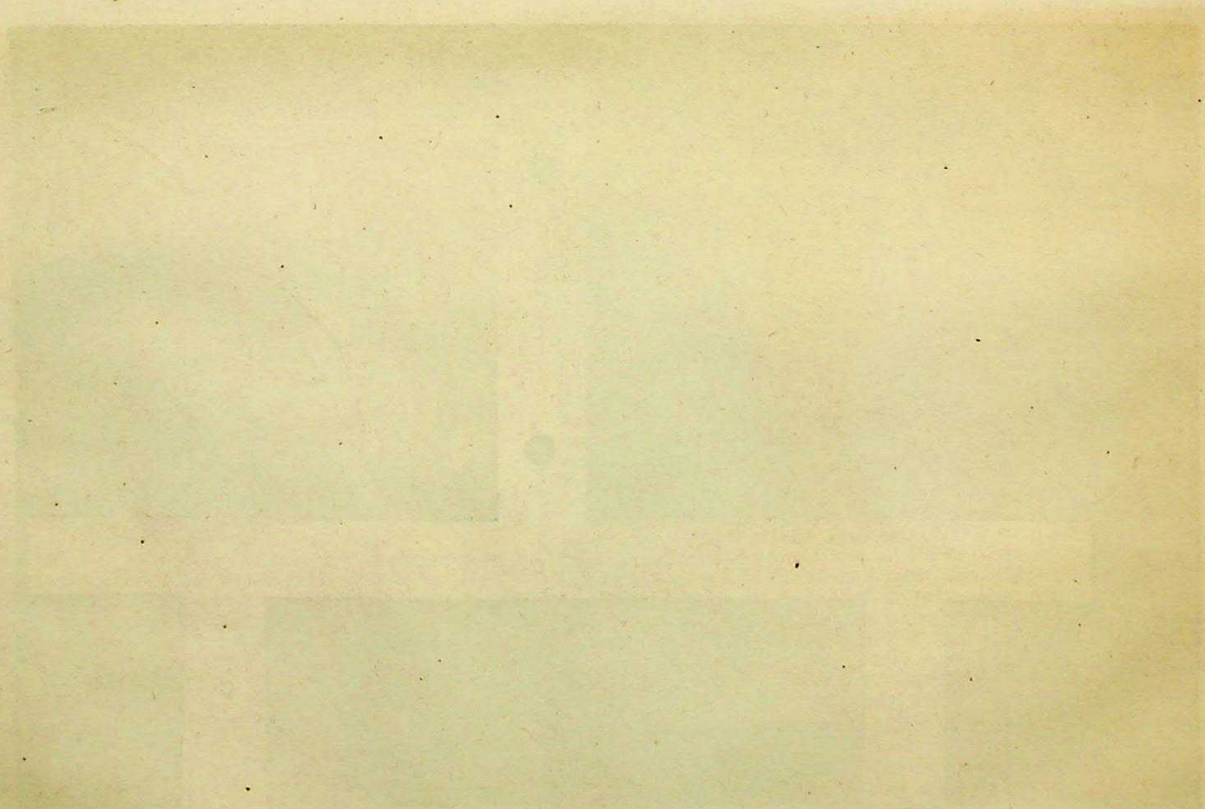
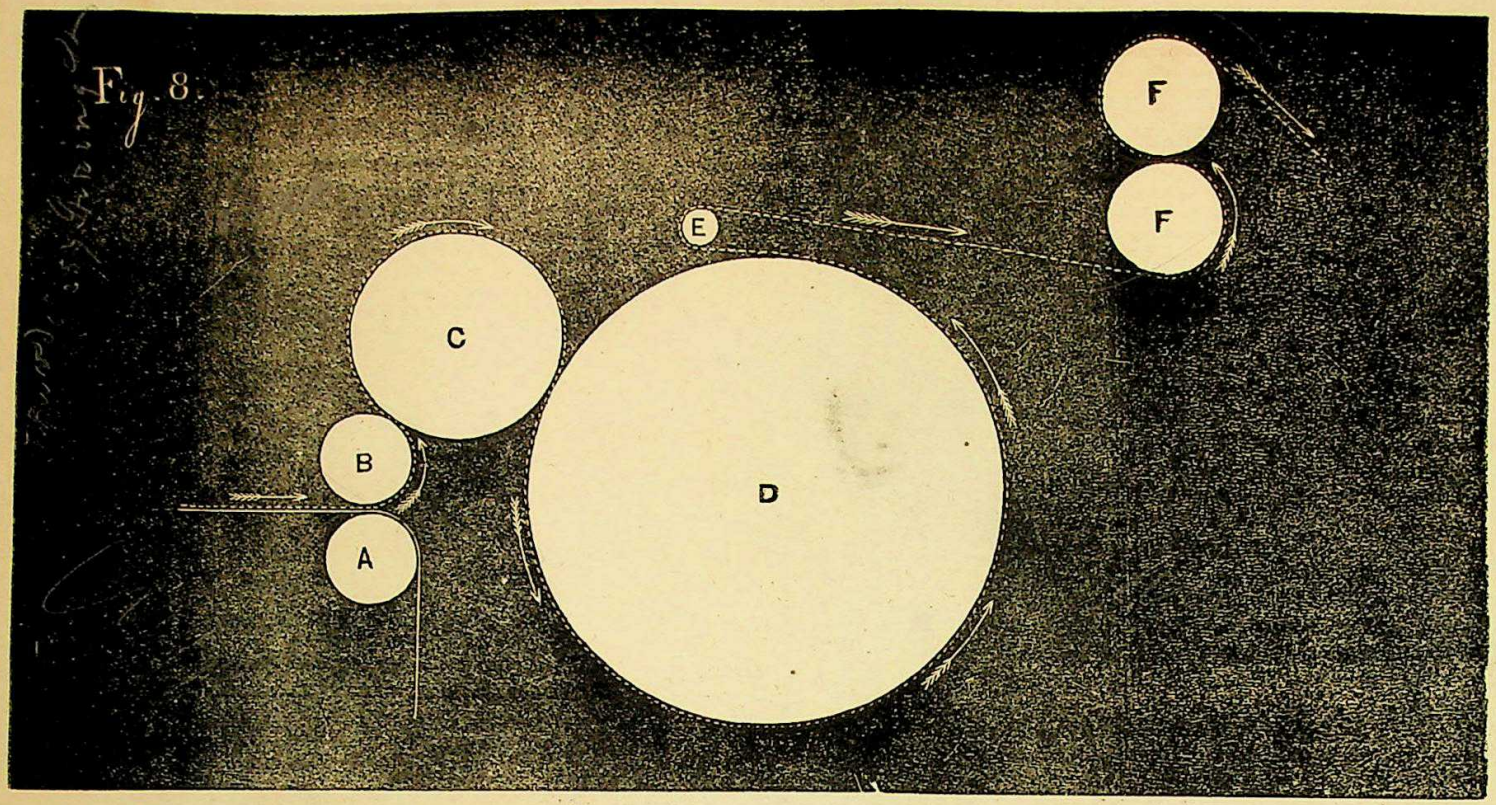
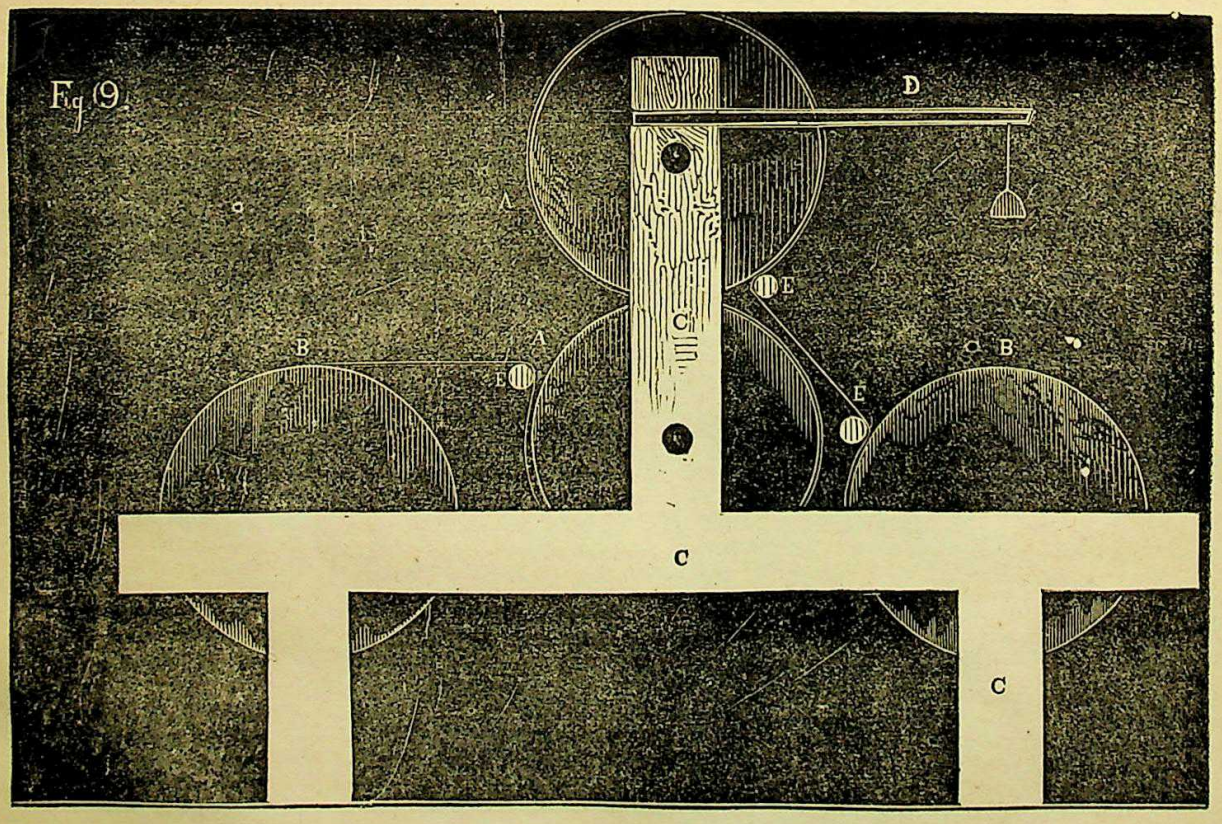


FIG. 8—FISHER'S MACHINE, MADE BY WRIGHT.



A. Wet Press Roll, iron. B. Wet Press Roll, wooden. C. Iron Cylinder, heated by steam, diameter two feet. D. Iron Cylinder, heated by steam, diameter five feet. E. Wooden Guide Roll. F. F. Cold Calenders. The dotted line represents the paper, of which the arrows show the direction.

FIG. 9.—HOWE'S MACHINE, (Or EDGARTON, WHITCOMB & CO.'S,) A. D. 1828.



A.A. Iron Rolls. B.B. Wooden Reels. C. Frame. D. Lever [See note (§) on page 98.] E.E.E. Wooden Guide Rolls. The white line represents the paper.

moistest and softest state of the material, against the side of the paper which had originally been next to the felt. For a time he also used, either practically or experimentally, cold naked iron calenders, operating in like manner against the same side of the paper, at three subsequent points of its progress round the same large cylinder; but afterwards discontinued this use of them, substituting calenders of paper* next to the drying cylinder, and placing the former iron rolls outside of the paper ones against which they were made to press. Two of these paper rolls were thus placed, one at each end of the horizontal diameter of the cylinder, and were bolted together by a rod, the third paper roll being in the intermediate space, beyond the middle point between the two first mentioned rolls.

The experimental changes made by Mr. Ames were numerous, in each of his different machines, and hence there was some difficulty in obtaining very clear views of them at any given time. But it appeared, with some approach to certainty, that at the date nearest to that of the plaintiff's patent, Mr. Ames had settled upon a mode of construction and use of his machine similar to that represented in the drawing, Fig. 6. His machine never exhibited a capacity for the adaptation of graduated heat at the successive stages of pressure, and it was impossible to use it in such a manner as to shift the side of the paper next to the surface of the drier. The consequence was a great want of uniformity in the two sides of the paper, which was often sold at a reduced price in consequence of one side being much rougher than the other. Messrs. Ames had in conversation admitted the superiority of the plaintiff's patent driers; and on one occasion had ordered a set, which were partially finished for them, but for some unexplained reason were not delivered.

CARTER'S MACHINE.

Robert Carter & Son used three detached driers, made before 1836, at Brattleboro'. In 1836 they introduced steam into the upper one of a pair of metallic press rollers of their wet machine. In the spring of 1838 their paper mill was consumed by fire, after which they never again used steam in the press roll; but on reconstructing the mill in the following autumn, they placed a single cold calender upon the outside of the last of the three driers. At a subsequent time, which was not exactly ascertained, but was after the date of the plaintiff's patent, and, according to the testimony of some witnesses,† more than two years afterwards, a similar calender was placed above, and in contact with each of the two other driers. After being used a short time in this manner, the calender was removed from the top of the first large drier, and was placed above, and in contact with, the small calender that had previously been on the top of the second drier.

It was proved that until after Mr. Carter had seen one of the plaintiff's patent driers he had had but a single calender, which was in contact with the last of his driers. The mode of its use and adaptation is seen in the drawing of his machine as set up in the fall of 1838, Fig. 7.

FISHER'S MACHINE.

The machine of A. & R. Fisher, as used by them after its final completion in the year 1839, is exhibited in the drawing, Fig. 8.

John Wright, of Wheeling, who constructed this machine for Messrs. Fisher, had projected it in the beginning of the year 1838. In the summer or fall of that year it was put into operation, but the large drier was so roughly made that it failed to answer any useful purpose. A better one made in the following year was substituted. After its substitution the machine was newly put into operation in June, 1839, without the pair of cold calenders exhibited in the drawing. In the same summer, or very soon after, these cold calenders were added, *to finish the paper*, as Mr. Wright testified. Before they were added, however, paper had been made with the other parts of the machine. There was a contrivance for easing, at the will of the operator, but none for increasing, the pressure of the large and small metallic drying cylinders against each other, at the point of contact ‡ As the machine admitted of only this single point of contact of the heated driers, there could be no regulation of either heat or pressure, as combined in their application to the paper, at *successive stages* of the varying texture of the damp sheet in its progress towards a dry state. It was not asserted that the surface of each side of the paper made by the machine had been of equal smoothness.

* Prepared with a hydraulic press. These paper rolls are used for calendering dry paper requiring a high finish, but are liable to be injured by contact with the sheet of unfinished paper in a damp state.

† The testimony of these witnesses was conclusively confirmed by a letter from Robert Carter & Son, dated Oct. 1, 1841, addressed to Messrs. Knight, in which they say they had not constructed drying cylinders similar to Messrs. K., adding: "The cylinders we now have are the same we have always used, and have not been altered in any shape or form, and we had never thought of making any alteration."

‡ Extract from notes of the testimony of Jacob Macer, examined for defendant concerning this machine. Looking at the model in court: "It was not fixed exactly as it is here. There were notches fixed by a screw for it to work in. It played about two feet. There were screws fixed to raise it up, *so as to ease it*, but not to increase it. They could do it, but it was never done. The screws were on for another purpose besides. Every day, when we were done, we had to raise the two-feet drier off the wooden roll. If left on, it always creates rust or stain in the drier; so we had to take it off."

HOWE'S MACHINE.

The remaining machine, that of Henry P. Howe, had been discarded before any of the other machines mentioned above were devised or constructed. If Mr. Howe had entertained or matured the mental conception of finishing paper by calendering it during its damp state, he had afterwards, for all practical purposes, abandoned, if he had not forgotten it. This appeared from the specifications of two patents obtained by him in the spring and fall of 1836, and from the contents of a letter written by him in May, 1839, and mentioned below. The first of his patents was for an alleged "improvement in the mode of drying paper by the application of dry heat, called *Howe's Patent Improved Cylinder Paper Fire Drier.*" The other patent was for an alleged "improvement in the construction of cylinders to be heated by steam, for the purpose of drying paper in the process of finishing the same, and for the drying of calicoes and cloths." In the specification he describes a machine, consisting, as that of the former patent, of a single cylinder,* and says: "The paper, calico, or cloth, is made to pass over the cylinder in the process of drying in the usual way. What I claim as new, and of my invention, is the construction and use of such cylinders as aforesaid, upon the plan and for the purposes aforesaid." At the date of these patents he resided at Shirley, in Massachusetts. He afterwards removed to Worcester, and there formed a partnership with Isaac Goddard, under the firm of Howe and Goddard. On the 11th of May, 1839, he wrote in the name of this firm a letter to a paper maker in Philadelphia, who was also a printer and the publisher of a newspaper, recommending among other things the fire drier, or single large cylinder above mentioned. This letter contained these words: "We will warrant our drier to dry as handsome paper as any other in the United States, except Ames's, of Springfield, that is *pressed on to the cylinder, which we don't do.*" This letter was written by Mr. Howe in the month preceding that in which the application was made for the plaintiff's patent. Three years afterwards, Mr. Goddard, the partner of Mr. Howe, obtained admission to one or more paper mills where the plaintiff's patented driers were in use; and after making himself acquainted with the mode of their construction and operation, commenced the manufacture, on an extended scale, of machines, consisting of three or more heated cylinders, arranged in horizontal succession, with two or more similar cylinders above them, each of which upper cylinders rested upon and between two of the lower ones, on a plan similar to that of the machine previously made by the defendant for Messrs. Wilcox, of which a drawing has been given, Fig. 4. In these machines, as in that of Messrs. Wilcox, the paper was ordinarily passed round a preparatory detached drier, that its texture might be adequately hardened before pressure.

In December, 1843, after these machines had been thus made to some extent by Howe & Goddard, the same Mr. Goddard visited Philadelphia, for the purpose of ascertaining on what terms they might purchase the privilege of using the patent of Mr. Knight in that section of the United States in which they resided. He had an interview with the patentee, but no arrangement was concluded. In the name of Howe & Goddard letters upon the subject were afterwards, during the same winter, written by Mr. Goddard. The following extract from one of them, may serve as an introduction to the remaining testimony, for the preparation and production of which the defendant appeared to have relied principally on Howe & Goddard. This letter, dated 29th January, 1844, after mentioning a proposal of an interview in New York, contained the following passage: "I do not know as it would be of any use. We should not do any better than I talked when at your place, and I will not say that I should do as well. Mr. Howe looks at it somewhat different from what I do. He thinks that there are some other facts that he has got hold of, that I did not take with me at the time I called on you. This I do not say to influence you to make any arrangement. My own impression is, as I said to you when there, that it would be the best for both of us; I mean you and us; but this part you must be your own judge. We have got your specification. This we got from the Patent Office since I was at your place. We perceive that your specification claims the right of placing the cylinders in pairs of twelve inch rolls, and ten of them. You will perceive that we do not place ours in pairs.† As to the word *pressing and drying at the same time*, we have two rights: one taken out by Burbank, which we own, and have owned it for six years; and the other taken out by Henry P. Howe. This is the one I showed you. All three of them use the same word, *pressing and drying simultaneously;* and all of them use this term."

Mr. Goddard testified that the three rights to which he here referred were: *first*, a patent to Isaac Burbank; *secondly*, not a patent, but a drawing and specification, which Edgarton, Whitcomb & Co., parties mentioned below, had once transmitted to Washington, with a view to a proposed application for a patent, which had, however, never been formally applied for—the papers connected with which proposed application were offered in evidence as stated below; and *thirdly*, Howe's fire drier, or single cylinder, patented in 1836, as above mentioned. Mr. Goddard deposed as to the first, that the machine conceived by Burbank, who was his uncle, had never been put into operation, and that after, or at about, the time of the expiration of the patent, Howe & Goddard had obtained it from him for five dollars.

* Like Ames's, Fig. 6, without the surrounding calenders.

† Referring to the upper ones being obliquely above the lower ones, as in Fig. 4, instead of vertically above them, as in Fig. 2. Of course this change involved no difference of principle.

This patent to Burbank, which was in evidence, had not been renewed after the burning of the Patent Office in 1836,* It bore date 8th Sept., 1824; the specification, 31st July, 1824. At those dates, the method of drying by contact with heated metallic cylinders was wholly unknown. The patent was for a "*revolving mould*," or modification of the *wet machine*. After describing it, and the operation of the wet press rollers, the patentee says:

"The pulp is freed from water, acquires the form of paper, and an endless sheet or sheets is delivered, according to the breadth of the mould and the pleasure of the manufacturer, the paper being here liberated from the felt.

"*Connected with said mould is a hot press made of rollers, as represented in Fig. 4 of the drawings.*† *The three upper rollers rest upon the fourth, and are hollow metallic cylinders heated by flues in the upright posts into which they are inserted. Underneath the fourth roller is a trough for sizing. The paper, after passing between the said rollers, in descending, is carried by the fourth roller through the sizing in said trough, and is then passed between two rollers of like construction below it, when it is sized and pressed, and thus far finished.*

"It should also be observed, that above the wet press roller is a fan roller which assists in detaching the paper from the felt.

"*The hollow mould, so constructed as aforesaid,* as not to suffer any liquid from the vat to pass into the inside thereof, except what strains through the wire cloth, *and the discharge of the water from the inside of said mould in manner aforesaid,* causing a current to set upon and pass through the wire cloth, thus lodging the pulp upon the same in manner aforesaid, *is the invention claimed.*"

The paragraph in italics, beginning with the word "*connected*," and ending with the word "*finished*," was the part of the specification relied on. If its meaning were what it was asserted to be by those who opposed the plaintiff's patent, yet, as the subsequent words showed conclusively that the patentee did not ask or receive a patent for, or claim to have invented, any part of the process which the specification professed to describe, beyond the wet machine, the plaintiff's counsel contended that it was not, for this subsequent part of the machine, a *previous patent* which could affect the validity of the patent of a subsequent original inventor, to whom no actual knowledge of its contents was imputed. The plaintiff, therefore, would not have been affected with constructive notice of this part of its contents, if it had remained in the Patent Office, or had been renewed after the fire of 1836. It stood, therefore, on the same footing with any other manuscript description of a mental conception, not embodied in a machine, or reduced in any manner to practical operation. Independently, therefore, of the length of time of its abandonment, and other particular circumstances, it was a point of no legal importance in the case.‡

The letters of Howe & Goddard stated no objection to the plaintiff's patent on the ground of any prior *construction or use* of a machine. But upon the trial, it was endeavored to sustain an objection to it, in fact and in law, upon this new ground. The history of the machine, of which evidence was introduced for this purpose, was as follows:

Mr. Howe, when in the employment of Edgarton, Whitcomb & Co., of Shirley, Massachusetts, in the summer of 1828, set up at their paper mill at that place a pair of hollow iron rollers 15 inches in diameter and 27 inches in length, one of which rested vertically on the other; and, according to the present recollection of the witnesses, was moved by friction of the latter, which was moved with other machinery by water power. Whether there was a lever on the upper cylinder was a point of little importance, on which the testimony was conflicting; but it seemed to be conceded that the weight of testimony was that there had been none.§ Into these cylinders steam was introduced from a temporary boiler, made by a peculiar adaptation of a potash kettle, to which a wooden lid had been fitted for the occasion. This boiler was said to have been used without any care or precaution, and from obvious causes to have soon exploded. The use of steam was then abandoned. The cylinders were afterwards, for a time, heated by bars of hot iron placed inside of them; after which Mr. Howe substituted a method of heating them, by placing a stove under and near the lower cylinder, and letting the upper cylinder, attached as a drum to the stove pipe, receive heat through it. When thus arranged and adapted, there was an addition made to the length of the cylinders. It was testified that the sheet of paper, after being pressed between a pair of wet press rolls of wood, was made to pass naked round nearly the whole circumference of one of the iron cylinders, and then underwent pressure between the iron cylinders, after which it was passed naked around the other iron cylinder, and was then reeled. The paper, after it had undergone this process, was hung out to dry in lofts, as was usual in those days.* The evidence was not clear that any paper had been made there which was not thus subsequently hung out to dry; though some of the witnesses thought that a portion of the paper had been of so thin a texture as to have been sufficiently dried upon the cylinders, when they were made to revolve slowly; and that the further process of hanging it out to dry having therefore been unnecessary, might probably have been dispensed with in such occasional instances.

This was the history of the machine as used by its first proprietors. It was not suggested that there had been any succession or repetition of graduated pressure, or any regulation of heat. An offer was, however, made on behalf of the defendant, to prove that before the explosion of the kettle, or boiler, above mentioned, and during the continuance of the experiment of using it as a means of heating the single pair of cylinders, Mr. Howe, or his employers, had conceived the idea of finishing paper by subjecting it to the repeated contact of successive heated metallic calendars, arranged vertically one above another, so as to act with graduated heat and pressure upon the naked sheet of paper passing between the calendars during the continuance of the drying process. This projected invention was said to have been identical in principal with the machines lately made by Howe & Goddard, and complained of by the plaintiff as an infraction of his patent, the difference in the arrangement of calenders in vertical instead of horizontal succession being, it was said, one of mere form and arrangement alone. As a part of the offer of evidence, it was proposed to prove that the description of such a machine was prepared, in the form of a specification of a proposed patent to be issued, not to Mr. Howe, but to Edgarton, Whitcomb & Co., with a suitable drawing; that this proposed specification was, in August, 1828, transmitted to the Patent Office, with a view to its being followed by a formal application for a patent. A copy of the proposed specification and drawing, verified by a witness, was offered in evidence. It not being asserted, or proposed to prove, however, that any such patent had been granted, or even formally applied for, or that the alleged invention or discovery had been embodied in a machine, or in any manner reduced to practice, the Court rejected the evidence offered to prove the transmission of the documents to the Patent Office.†

The two-cylinder machine of Mr. Howe, with the adaptation of the stove and smoke-pipe, was used until 1833, when it was taken down and carried to a barn, where it remained for a year or two. It was afterwards disposed of to John P. Whitcomb, or a firm of which he was a member, by whom it was used in a similar manner during two successive winters, for the purpose of partially drying wrapping paper, to prevent it from being frozen in the drying loft, where it was afterwards hung out. It was not used in any other season than the winter, and then only for this purpose. In 1836, a single large drying cylinder, operating as Howe's Fire Drier, without pressure or calendering of any sort, was substituted for the two-cylinder machine in question, the use of which, from that date, was finally abandoned. The cylinders remained in a loft of Mr. Whitcomb for ten years, more or less. The frame on which they stood was gone; but they were exhibited before the Court and jury on a new one, constructed for the purpose during the trial. Mr. Whitcomb testified that the whole subject of these cylinders had very much gone out of his mind, and that his endeavors to recall them to his memory had caused him great difficulty. There was contradiction in almost every particular in the testimony of the witnesses who had deposed concerning their previous use at Shirley. This was supposed to be partly explained by the circumstance, that they were said to have been partly excluded from view by a wooden frame, within which they had been encased, the paper passing to and from them through slits in the wooden enclosure.

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* See act of 1837. This was also the case with Ames's patent of 1835, and both the patents to Howe of 1836, above mentioned.

† The drawings had been detached from the patent. A loose paper produced was said to be the one here referred to, but it was not verified.

‡ Under the 7th and 15th sections of the Patent Law of 1836, a previous invention of a machine cannot be opposed as an objection to the validity of a patent to a subsequent original inventor, unless the former invention has been embodied in a machine *actually constructed* and applied to use, or has been *patented,* or has been *described in a public work.* See 1 Sto. Rep. 599.

§ A witness for defendant, who had made a drawing of the machine at the time, with a lever and weight attached to the cylinder, testified that this part of the drawing was "a fancy sketch," and that there had never, in reality, been either lever or weight. He was supported by another witness for defendant; while, however, two others thought that there had been a lever. Fig. No. 9 is a copy of the drawing.

* The first use of metallic driers was in the calico business, a short time only before these experiments of Mr. Howe. If they were then used in the paper-making business in England, it must have been done to a very limited extent. The Penny Magazine of September 28, 1833, mentions "the beautiful contrivance of drying and smoothing the sheets" by hot cylinders as a "modern application to the machine," giving "the process a perfection which is unattainable in the system of dryiug each sheet, either by exposure to to the atmospheric air, or to steam upon poles." They were first introduced into this country from England, but were not extensively used until after 1831. After 1833 the system of drying in the loft ceased to be a general one.

The drawings in the same number of the Penny Magazine, and in Ure's Dictionary, edition of 1839, and the descriptive accounts of the process in these and other publications, show that the drying cylinders were never used in contact with one another. The paper, after being dried, was calendered by a distinct pair or pairs of rollers.

† The documents were, however, before the jury, having been referred to in a deposition concerning an alleged conversation with the patentees in the winter of 1843-4, in which they were said to have been exhibited and remarked upon.

(*To be concluded in No. 5.*)

ASTRONOMICAL.

PHYSICAL CONSTITUTION OF THE MOON.

(BY PROFESSOR E. LOOMIS, NEW YORK UNIVERSITY.)

We are indebted to the "Sidereal Messenger" of September, 1846, a monthly journal devoted to Astronomical Science, and we believe the only *popular* periodical of the kind ever published, for the following interesting Essay upon the *Physical Constitution of the Moon.* The Messenger is under the editorial charge of that eminent scientific lecturer, O. M. Mitchel, Esq., director of the Cincinnati Observatory; whose assiduity in the erection of that edifice is worthy of all praise, and affords another instance of what may be accomplished by an unremitted perseverance. The circumstances connected with the origin and final completion of the Observatory—which will stand a lasting monument to Mr. Mitchel's fame—we shall take occasion to notice in a future number of the Mirror.—[*Editor.*]

It is a very common impression, and one of which many people are extremely tenacious, that the moon is occupied by a race of animated beings, not unlike the inhabitants of our globe. Nor is this impression confined to the illiterate. It is cherished by many who are well informed on other subjects, and even by some whom the public regard as oracles in the mysteries of astronomy. It may be said that such opinions are harmless, even if they prove untrue; but believing that truth is always better than fiction, I propose to inquire how far these popular notions are founded in reason.

A little reflection upon certain phenomena, which cannot escape the notice of the most casual observer, must convince us that the physical condition of the moon's surface is very unlike that of the earth. If, on a clear summer's day, an observer was to rise in a balloon high enough to comprehend, in one view, a vast extent of country, he would see a landscape spread out before him like a picture, diversified with various colors, of which green would be the predominant hue, and the little irregularities of elevation would dwindle down to a perfectly smooth and even surface. If clouds should arise, intercepting the landscape from his view, the green foliage of summer would give place to a fleecy curtain, which, in presence of the sun, would appear of a dazzling whiteness. Thus, from day to day, our æronaut would behold alternately a landscape of pleasing verdure, and a canopy of clouds too dazzling for the eye to rest upon. As the autumn advances, the green foliage of the forests would give place to the richest combinations of yellow and crimson, and after a few weeks would succeed the sombre hue of winter. This hue would remain for months unchanged, except by clouds and the fall of snow, which would give to the landscape a dazzling brilliancy scarcely distinguishable from the former, except by its greater permanence. If our observer were removed to the distance of the moon, and were to watch the appearance of the earth from month to month, although minute objects could no longer be separately distinguished, his unassisted vision would enable him to distinguish between a clear and a cloudy day on the earth—between the rich verdure of summer, and the frosts and snows of winter.

No such changes are perceived on the surface of the moon. Except the alternation of day and night, the moon's surface, for 2000 years, has exhibited no change to the naked eye, and it is not quite certain that any change has ever been perceived with the most powerful telescope. One stereotype mass exhibits the lunar surface from age to age, even in its minutest peculiarities. Some astronomers have fancied that they saw volcanoes in a state of eruption. It is not quite clear that these appearances were not an illusion; but all admit that the moon's face exhibits no changes, unless such as are telescopic. Here, then, the moon's surface and that of the earth presents a contrast which must strike every reflecting mind. There are no clouds on the moon, and no great physical changes with the seasons of the year, such as we witness upon the earth.

But why are there no clouds upon the moon? If the moon has an atmosphere charged with aqueous vapor, it is difficult to understand why this vapor should not sometimes undergo precipitation. The mean temperature of the moon must be about the same as that of the earth; and the changes of temperature upon its surface must be very great from month to month. The absence of clouds must excite a suspicion that the moon is destitute of an atmosphere, or destitute of liquids capable of evaporation by heat. Have we any means of deciding this point? An atmosphere which was transparent, of course, could not be *seen;* but there are various effects by which its existence would be rendered sensible.

The first of these effects is *twilight.* To the inhabitants of the earth the transition from the brightness of noonday to the darkness of midnight is very gradual. No sudden loss of light marks the instant when the sun sinks below the horizon. An observer sufficiently elevated to comprehend half of the earth at one view, might see a certain portion brilliantly illuminated by the direct rays of the sun, another portion immersed in the darkness of night, and between these the transition would be so gradual, that it would be impossible to say precisely where day ceased and night began. The breadth of this twilight is eighteen degrees, and is owing to the dispersive effect of our atmosphere upon the sun's light. If the moon has an atmosphere like our earth, it must produce a similar effect. But, on the contrary, the boundary between the illuminated and unilluminated portions of the moon's disc is always very sharply defined. Whether we observe with the naked eye, or with the most powerful telescope, we have no difficulty in saying precisely where day ceases and night begins. The shadows of the lunar mountains are dark as midnight. The transition seems instantaneous from midnight to noonday. We conclude that the moon has no twilight—or, rather, the legitimate conclusion is, that the moon has no twilight which can be appreciated by this mode of observation. More refined methods of observation have disclosed the existence of a feeble twilight. If there were no atmosphere, the line which joins the extremities of the horns of the new moon should pass exactly through the centre of the disc; that is, the ring of light should be an exact semicircle. By observing the moon when her phases were extremely falcated, Shrœter discovered a faint glimmering light extending from both the cups beyond the semicircle. The greatest breadth of this twilight was two seconds—corresponding to about two miles on the moon's surface. We admit, then, that the moon has a twilight, extending about two miles in breadth, from which we compute that the height of the denser part of the moon's atmosphere is 1,500 feet.

Another effect by which the existence of an atmosphere may be rendered sensible, is that of *refraction.* A ray of light, while continuing in a uniform medium, always moves in a straight line; but in passing from one medium to another of different density, its direction is changed. The light of the sun moves in straight lines until it reaches our atmosphere, when its course is changed. It is bent downwards towards a perpendicular to the earth's surface; and since objects are seen in the direction of the ray of light when it enters the eye, all the heavenly bodies appear elevated by refraction. Near the horizon their effect is more than half a degree, so that we may see the entire disc of the sun, when, were it not for refraction, it would be wholly below the horizon. Now, if the moon has an atmosphere, it ought to produce a similar effect; and we

are furnished with frequent opportunities of testing this question with great precision. The moon, in its monthly circuit through the heavens, must often pass over and conceal from our view small stars. Occasionally, stars of the first magnitude, and planets even, are occulted; and such phenomena are easily observed with the naked eye. Now, when the edge of the moon's disc approaches a star, the instant before its disappearance its light must pass through the moon's atmosphere, if there be any, and suffer refraction. The light of the star, instead of moving in a straight line, must be bent behind the moon, and the star must be seen later than it would be without refraction. The contrary effect must take place at emersion—the star must re-appear sooner than it should if there were no refraction; in other words, the *duration* of an occultation is diminished by refraction. Now, it is easy to bring this question to the test of experiment. We can compute the time required by the moon to move over a space equal to its diameter, and we have but to compare with this the time of the star's disappearance. This observation has been repeated a thousand times, and the result is, that the two intervals are identically the same. For a long time it was considered doubtful whether there was any appreciable difference; but astronomers are now generally inclined to the opinion that there is a difference of a few seconds. This would indicate that the moon's atmosphere does refract light; but the effect is exceedingly small. The refraction produced by the earth's atmosphere is more than a thousand times greater than that of the moon. The pressure of the moon's atmosphere would be balanced by a column of mercury one forty-fifth part of an inch in height. The best French air-pumps are warranted to rarify air to one twenty-fifth part of an inch of mercury. The atmosphere of the moon is *still rarer* than this. In popular language, we speak of *exhausting* the air from the receiver of an air pump, and producing a *vacuum*. In conformity with the same usage, we ought to say that the moon has *no* atmosphere. In philosophical strictness, however, we only *rarify* the air in the receiver of a pump; and when the pump ceases to operate, the receiver is still *filled* with air of diminished density. So, also, if we use language with the utmost precision, we must say, the moon *has* an atmosphere; but to avoid being misunderstood, we should add, that *it is more rare than any we can produce with our best air-pumps.*

Hitherto I have said nothing about the existence of water in the moon. The disc of the full moon exhibits to the naked eye various dusky portions of great extent, which were formerly denominated seas. Viewed, however, with powerful telescopes, they all exhibit cavities and insulated peaks which are permanent in their form, and therefore inconsistent with the properties of liquid bodies. It is now conceded by all, that there are no large collections of water upon the moon. But may there not be small bodies of water, such as lakes, rivers, &c.? The facts which have been already stated enable us to answer this question. The mean distance of the moon from the sun is the same as that of the earth; and we may assume its mean temperature to be about the same—say 50°. Now, if there is any water on the moon, a portion of it must rise in vapor. It may be objected, that if the moon has no atmosphere, or so inconsiderable a one as we have shown, then vapor could not ascend. This objection is founded upon an idea which is very prevalent, but which is wholly erroneous. Vapor does not require an atmosphere to sustain it—*it sustains itself.* It is itself an atmosphere; and an atmosphere of aqueous vapor sustains itself just like an atmosphere of oxygen or nitrogen. The presence of air does not *assist* evaporation; it only *retards* it. A drop of water introduced into a Torricellian vacuum instantly flashes into vapor. If, then, there is the smallest collection of water on the surface of the moon, a portion of it must rise in vapor, forming an atmosphere; and the density of this atmosphere will depend upon its temperature. The vapor which is formed at a temperature of 50°, will produce a pressure equal to a column of mercury two-fifths of an inch in height. Such an atmosphere would produce a refraction more than ten times greater than that observed on the moon. Hence, the moon is not surrounded with any such atmosphere. But if there is any collection of water on the moon evaporation must commence, and *it will not cease* until the vapor has acquired an elasticity sufficient to sustain a column of mercury two-fifths of an inch in height. The conclusion is irresistible, that *there is not one drop of unevaporated water on the moon.* Neither is there any other liquid capable of evaporation by the heat of a summer's sun. There is not a drop of blood in the veins of the lunar animals; there is not a particle of sap in the pores of the lunar vegetables; there is not an atom of moisture in its soil. While groaning under the heat of a vertical sun, during a day whose length is thirty times the length of our own, the emperor of the moon could not command a drop of water to cool his parched tongue.

What an abode is this for animated beings like man? How could any species of animal or vegetable life exist without air or water? If we put a mouse into the receiver of an air-pump, and exhaust the air, the animal expires long before the air approaches the rarity of the lunar atmosphere. The conclusion is irresistible, that the moon must present a picture of perfect sterility and desolation. Not the slightest trace of vegetation is found upon its surface. It is doubtful whether the humblest form of vegetable life known upon the earth could there maintain an existence.

But, says a popular writer, "the moon, although it ranks among the smallest of the celestial bodies, may contain a population of intelligent beings far more numerous, and perhaps far more elevated in the scale of intellect, than the inhabitants of our globe. It forms no proof that the moon is destitute of an atmosphere, because its power of refracting light is different from ours. An atmosphere may be so fine and transparent that light may pass through it without changing its direction."

To this I reply, that every thing material with which we are acquainted on the earth's surface has the power of refracting light; and it is unphilosophical to assume that matter on the moon possesses different properties from matter on the earth, unless we are compelled to admit it by direct testimony. If there were any direct evidence of the existence of animal life on the moon, then we should be compelled to admit that life might subsist on air of extreme rarity, or perhaps even without air. But the only safe rule in philosophy is, to assume that the laws of nature are uniform, and to admit no exceptions unless compelled by positive testimony. We have no reason to admit any thing to be material which does not reflect light. If, then, the moon has inhabitants, they must be capable of living on immaterial oxygen; the animals and vegetables upon which they feed must require neither liquids nor gases for their sustenance; there can be neither air in their lungs nor blood in their veins. If they had wings they could not fly, for there is no air to sustain them. If they had legs they could not walk, for joints require lubricating fluids. Breathless shadows! You might people Vesuvius and Etna with like inhabitants; nay, they might fill the interplanetary spaces, for they are spiritual beings, and their bodies could not obstruct the free passage of the rays of light.

But if the moon was not made to be the abode of intelligent beings, for what end was it made? To this question I freely answer, *I cannot tell.*

MUSHROOMS—BEWARE!—Accounts of persons being poisoned in consequence of eating toadstools instead of mushrooms, are quite frequent. Not long since, says an exchange paper, three persons in Dutchess county, New York, were poisoned in this way. They were all dead in a few hours.

AGRICULTURAL.

THE CROPS FOR 1846.—An estimate taken from the letter of the Secretary of the Treasury of December 10, shows the quantity of each of the following staples raised in the United States during the year 1846, with the value of each production, according to the prices they bore in the New York market on the 1st December last, to be as follows, viz :

Cotton,	760,000,000	lbs.,	valued at	$73,150,000
Oats,	179,528,800	bushels,	"	69,567,410
Rice,	97,741,500	do.	"	3,786,483
Barley,	5,676,600	do.	"	3,434,343
Rye,	29,892,500	do.	"	23,465,612
Wheat,	117,202,800	do.	"	121,011,891
Ind. Corn,	459,666,900	do.	"	314,872,820
			Total value,	$609,288,559

Although the above statements are founded on the best information that could be obtained, yet they are believed to be far below the quantity actually raised.

MAPLE SUGAR.

The quantity of maple sugar made in 1839, according to the census of 1840, was 35,000,000 lbs. As the settlements of new regions have been extensive since 1839, while the quantity of maple sugar made in the old States cannot have diminished essentially, we believe that the whole quantity made in 1846 was near to 40,000,000 lbs. In 1839, the quantity made in the little State of Vermont was nearly 5,000 000 lbs. In all New England the quantity was about 6,750,000; in New York, 10,000,000; in Pennsylvania, 2,250,000; in Virginia, 1,500,000; in the free West, about 12,000,000; in Kentucky and Tennessee, about 1,600,000; in Missouri, 275,000 lbs. Sugar from cane can be produced in none of these States. In Louisiana, the whole quantity, and all cane sugar, was 120,000,000; in the rest of the South, and probably all cane sugar, about 660,000. Thus, of about 155,000,000 pounds of sugar produced in the Union, 35,000,000 were maple or corn sugar, and mostly maple. Thus the whole quantity of maple, to cane, was as 7 to 31, or nearly one fourth.

Since 1839 the emigration to Virginia from the Eastern and Middle States has been extensive, and the result has been a great improvement in its agriculture; and as the hills of that fertile State abound in the sugar maple, such a source of profit could not have been overlooked by the thrifty settlers from New England, New York, and Pennsylvania, especially when maple sugar is made in a season of comparative rest from other agricultural labor, and is therefore *clear gain* to the farmer. The product of Virginia, only 1,500,000 in 1839, was probably 3,000,000 in 1846.

SUGAR IN LOUISIANA.

The Baton Rouge Cultivator of the 9th ult. says: "There is a falling off of the sugar crop on the right side of the river from Point Coupee to New Orleans, of 20,215 hogsheads—the crop of 1845 being 58,002, the crop of 1846 being 37,787. When it is remembered that the increase of sugar plantations has been in the district of country above named as follows—1845 there were 265 plantations, in 1846 there were 328 plantations—it shows the immense falling off of the crop of an average of more than one half."

A very superior article of Texas sugar has been received in New Orleans, and readily sold. It was raised in Western Texas. Other specimens from the Colombo, Bernard, and Navidad, equal to the best Muscovado, have also been received.

BEET ROOT A SUBSTITUTE FOR POTATOES.

Beet root cannot be too much recommended to the notice of mankind as a cheap and salubrious substitute for the now failing and diseased potato. Hitherto the red kind has been only used in England as a pickle, or as a garnish for salad; even the few who dress it generally boil it, by which process the rich saccharine juice is in a great measure lost, and the root consequently rendered less nutritious by the quantity of water which it imbibes, as well as by parting with the native syrup of which it is thus forcibly deprived. It is therefore strongly recommended to bake instead of boiling them, when they will be found to afford a delicious and wholesome food. This is not an untried novelty, for both red and white beet root are extensively used on the continent; in Italy particularly, they are carried about hot from the oven twice a day, and sold publicly in the streets. Thus they are purchased by all classes of people, and give to thousands, with bread, salt, pepper, and butter, a satisfactory meal. There are few purposes for which baked, or even roasted, or fried beet root, would not be found preferable to boiled. If these roots were as universally cultivated in England for human food as they are on the continent of Europe, and baked and sold as cheap, as they might easily be, many a poor person would have a hearty and good meal who is now often obliged to go without one; and now that the potato crop is again failing, the above information cannot but be of infinite service if generally known, for there is a good deal of beet in the country, although only planted or sown for the use of cattle.—*European Times.*

Yams have been cultivated in Jefferson county, Kentucky, with success. They are an excellent substitute for the potato.

POTATO CROP.

A London correspondent of the National Intelligencer says: "The deficiency of the potato crop of last year is estimated at 8,142,599 tons; to supply this deficiency would take, as an equivalent, 1,438,324 tons of Indian corn, which, at 1d. per lb., would amount to £13,424,357.

PRODUCTS OF IRELAND.

A return of the aggregate amount of provisions imported from Ireland into England in the last three years, ending January, 1847, moved for by Mr. P. Scrope, shows that the quantity of corn (of Irish growth) so imported, amounted, in 1844, to 2,801,206 quarters; in 1845, to 3,251,901 quarters; and in 1846, to 1,825,394 quarters. The quantity of wheat flour and oatmeal amounted, respectively, in 1844, to 839,567 cwt., and 1,150,976 cwt.; in 1845, to 1,422,379 cwt., and 1,059,185 cwt.; and in 1846, to 723,562 cwt., and 553,141 cwt. The number of cattle exported from Ireland to Great Britain, in the year 1846, was as follows: 185,483 oxen, &c.; 6,363 calves; 259,257 sheep and lambs; and 480,327 swine.

SINGULAR PREDICTION.

The celebrated William Cobbett predicted, as long ago as 1826, that the potato would prove the curse of Ireland. In a conversation with Dr. Smith, a Catholic priest, he said: "You have four millions of souls in Ireland, and eight millions of acres of uncultivated ground. This ground must be drained and brought into cultivation, and you must again grow wheat, oats, rye, &c. The potato will not last more than twenty years, when it works itself out, and then you will see to what a state Ireland will be reduced. You *must* return to grain crops; and then Ireland, instead of being the most degraded, will be one of the finest countries in the world. You may live to see my words come true, but I never shall." Dr. Smith made a note of the conversation at the time.

CONSUMPTION OF TOBACCO IN ENGLAND.

According to official returns, Great Britain consumed in 1846

twenty-six millions five hundred and fifty-seven thousand one hundred and forty-three pounds of tobacco, which, at three shillings sterling, or sixty-seven cents per pound duty, put into her treasury nearly eighteen millions of dollars. The stock of tobacco on hand in the kingdom on the 1st of January, 1847, reached the large quantity of 59,355 hogsheads, which, when consumed, will put into the British treasury the sum of about *forty-seven millions of dollars.*

TOBACCO CANDY.

This article, said to be so vastly superior to the most celebrated of the day, is now made in North Carolina. It is made from the boiled extract of tobacco stems. It is very dark in color of course, of a bitter sweet taste, inferior in point of pleasantness to hoarhound. We were not before aware that tobacco had so much saccharine about it; this candy, however, exhibits it in a very high degree. Tobacco possesses many valuable and medicinal qualities, and this method of preparing it may render it a very efficient and agreeable remedial agent.

INTRODUCTION OF THE CULTIVATION OF RICE INTO FRANCE.

The design has been formed of introducing the culture of rice into the delta of the Rhone. According to experiments made on a surface of 25 hectares, the rice plant promises a plentiful yield of about 50 per cent. In the sitting of the Scientific Congress, at Marseilles, a calculation was presented, according to which about 20,000 hectares (48,500 acres) of the salt land at the mouths of the Rhone, and which is capable of being flooded, could be turned into rice fields. The whole area, at an average of 50f. per hectare, is now scarcely worth 2,000,000f.; while if rice were grown upon it it would be worth 3,000f. per hectare, (the hectare is a trifle less than 2 1-2 acres;) and thus the landed property of the department would be increased in value by 120,000,000f., and even 300,000,000, if this branch of agriculture were also introduced into the neighboring departments.—*European Times.*

THE WHEAT INSECT.

A correspondent of the New York Mirror gives the following account of an occurrence which came under his own notice, and which may serve to throw some light upon the nature and character of that plague of farmers, the wheat insect. He says:

"In the spring of 1844 I placed a bag containing half a bushel of white flint wheat in a seed drawer, under glass, and near the furnace of my green-house. On the 6th of March, 1845, I opened the bag, and to my surprise found thousands of living insects, such as are now presented to you; some were on the point of leaving the kernel, others were just commencing to eat through, and many were perfectly formed and running about in all directions. Six years ago I was in the habit of soaking my early grains in salt brine for the purpose of destroying the egg of the insect, which I assured my neighbors, much to their amusement and unbelief, *was* ensconced in the kernel. Now, by accident, the fact is made manifest. The insect would not have appeared until June, perhaps, had the wheat been sown. The warm situation it occupied in the green-house brought it thus early to maturity."

TO PROTECT GRAIN FROM RATS.

An individual of much practical experience informs us that green elder deposited in and about the mows of hay and grain, will prove an effectual preventive against the depredations of mice and rats. These animals are frequently very destructive in their ravages, and if a remedy so simple and easy of attainment is efficacious, it deserves to be known and remembered by all. We have long known that the leaves of the common mullein will drive rats from their haunts. There is something in the odor of this plant that is as disgusting to their ratships as was the leek to ancient Pistol—they "cannot abide it."

A FARMER'S BAROMETER.

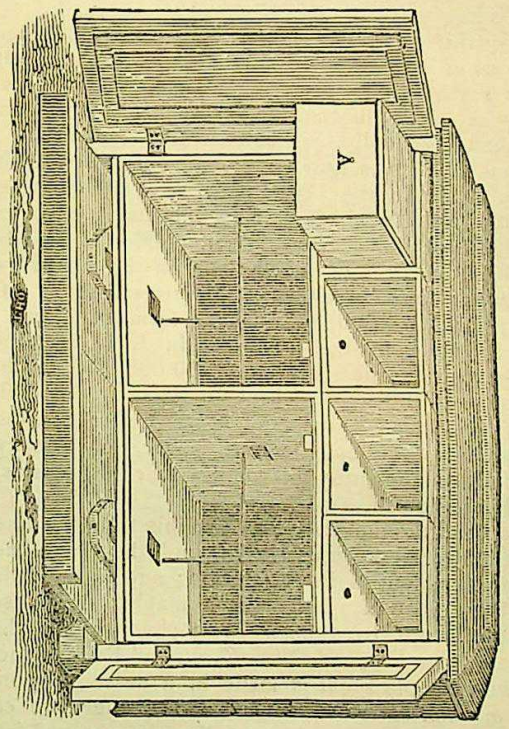
A writer in the Georgia Farmer gives directions for making a cheap barometer, to aid in foretelling the weather. He takes a stick three feet long, and attaches to the butt end a phial, full of air of course, and corked tight. The stick is then suspended in a horizontal position on a pivot, where it will readily turn, say on a thread tied near its centre. When the storm is coming on, the air outside is lighter than that within the phial; of course the phial sinks, and indicates a change in the atmosphere. Such a barometer may be made in ten minutes, and some of our young philosophic farmers will incline to have barometers of their own manufacture.

The arrival of three bales of raw silk, by the Elizabeth, from New Orleans, has excited much interest in Liverpool, and the announcement has travelled through most of the English papers.

IMPROVED BEE HIVE,

WITH PAPER LINED HONEY BOXES, BY SABIN & HOWE.

Patented, January 15, 1846.



This Hive surpasses all others in its conveniences for removing the comb from the honey boxes, which are made so as to take apart, and are lined with thick paper that can be removed at will, together with honey contained therein; at A in the Cut, the paper is partly drawn out, this is done without breaking the comb. The box can then be replaced, lined with a new paper, which is all that is required in the change, and a child is capable of so doing. The Hive is shaped like a bureau or other piece of furniture, and is made more or less ornamental to suit the purchaser, in the bottom there is a drawer with which the bees enter, from this they ascend through an opening in the top surrounded by a grating through which they first pass, this aids in preventing destruction from the moth as they deposit their eggs in the gratings in the drawer, from which they can from time to time be removed without disturbing the bees; this is the surest guard against their inroads.

RECEIPTS FOR VARNISH.

Black Copal Varnish.—Take Lamp-black or Ivory-black in fine powder, and mix it with the Varnish.

Blue Copal, do.—Indigo, Prussian blue Verditor or ultra marine, all of these substances must be powdered fine, proceed as before.

Fine pale Copal Varnish.—Pale African Copal, one part, fuse, then add hot pale Oil, two parts; boil until the mixture is stringy, then cool a little and add pale Turpentine (spirits) 3 parts,—mix well.

Flaxen gray Copal Varnish.—Ceruse which forms the ground of the paste, mixed with a small quantity of Cologne earth, as much English red or carminated lake, and a particle of Prussian blue, and colour the Varnish therewith.

Green Copal Varnish.—Verdigris crystallized, Verdigris compound-green, (a mixture of yellow and blue,) the first two require a mixture of white in proper proportions from a fourth to two-thirds, according to the tint intended to be given, the white used for this purpose is *Ceruse* or the white oxide of Lead or Spanish white; proceed as before.

Improved Copal Varnish.—Catouchoucine, (white and scentless,) strongest Alcohol, equal parts; Copal in the proportion of two pounds to a *gallon*, digest in a close vessel without heat for one week.

Pearl Gray Copal Varnish.—White and black; white and blue; for example; Ceruse and Lamp-black; Ceruse and Indigo; mix them with the Varnish according to the tint required.

Purple Copal Varnish.—Prussian Blue and Vermillion, or any other blue and red; then proceed as before.

Red Copal Varnish.—First, Vermillion, red oxide of Lead, (minimum,) red Ochre, or Prussian red, &c.; and proceed as before. *2d.* Dragons blood, Brick red or Venitian red, &c.; and proceed as before.

Violet Copal Varnish.—Vermillion, blue and white, in proportion as required to colour the Varnish.

White Copal Varnish.—Copal 16 *parts*, melt and add Linseed Oil, *(hot)* 8 parts; Spirits of Turpentine, 15 parts; finest white Lead to colour.

Yellow Copal Varnish.—Yellow oxide of Lead, or Naples and Montpelier, both reduced to impalpable powder. These yellows are hurt by the contact of Iron and Steel in mixing them up, therefore, a horn *Spatula*, with a glass mortar and pestle, must be employed, or Gum *Guttæ*, yellow Ochre, or Dutch pink, according to the nature and tone of the colour to be imitated, and proceed as before.

Copal Varnish in common use.—Copal 30 parts; drying Oil, 25 parts; Spirits of Turpentine, 50 parts; put the Copal in a vessel capable of holding 200 parts, and fuse it as quickly as possible, then add the Oil previously heated to nearly the boiling point—well mix; next cool a little, add the Spirits of Turpentine—again well mix, and cover up until the temperature has fallen to (140° FAHR.,) then strain.

Body Varnish.—African Copal, one part; fuse, then add pale Oil, 2 parts; boil very gently until quite stringy, cool a little, and add Spirits of Turpentine, 4 parts: mix well.

Quick Drying Body Varnish.—Copal (pale,) 16 parts; pale Oil, 32 parts; dried Sugar of Lead, 1 part, Spirits of Turpentine, 55 parts; boil until stringy, then gum anine, 16 parts; pale Oil, 32 parts, Spirits of Turpentine, 55 parts; white Copperas dried and powdered, 1 part; boil and strain as before, then mix the two quantities together.

The celebrated brilliant French Varnish for Boots and Shoes.—Take ¾ of a pint of Spirit of Wine, 5 pints of white wine, ½ pound of Gum Senegal, in powder, 6 oz. of loaf Sugar, 2 oz. of powdered Galls, 4 oz. green Copperas; dissolve the Sugar and Gum in the Wine—when dissolved, strain them, and put it on a slow fire, being careful not to let boil—in this state put in the Galls, Copperas, and Alcohol, stirring it well for 5 minutes, then set off, and when nearly cool, strain through flannel and bottle for use. It is applied with a pencil Brush. If not sufficiently black a little sulphate of Iron and ½ pint of a strong decoction of Logwood, may be added with 1-16 oz. of Pearlash.

Liquid Japan for Boots and Shoes, Harness, &c.—Take Treacle, 8 parts; Lampblack, 1 part; Sweet Oil, 1 part; Gum Arabic, 1 part; Isinglass, 1 part; mix well in 32 parts of water, apply heat—when cool add one oz. of Spirit of Wine, you may add an ox's gall, place the bottle by the side of the fire before use, and apply with the tip of the finger or sponge.

Cabinet Maker's Varnish.—Pale Shellac, 700 parts; Mastic, 65 parts; strong Alcohol, 1000 parts; dissolve—dilute with Alcohol.

Callet's Soft Etching Varnish.—Linseed Oil, 8 parts; Benzoin, 1 part; white wax, 1 part; melt and keep it heated until reduced to two-thirds.

Pale Carriage Varnish.—Take Copal, 32 parts; pale Oil, 80 parts; fuse and boil until stringy, then add dried white Copperas, 1 part; Litharge, 1 part; boil again—then cool a little, and mix in spirits of Turpentine, 150 parts; strain. While making the above, take Gum *Anine*, 32 parts; pale Oil, 80 parts; dried Sugar of Lead, 1 part; Litharge, 1 part; Spirits of Turpentine, 170 parts; pursue the same treatment as before, and mix the two varnishes while hot.

Second quality Carriage Varnish.—Take Gum Anine, 32 parts; Oil 100 parts; Spirits of Turpentine, 150 parts; Litharge, 1 part; dried Sugar of Lead, 1 part; dried Copperas, 1 part; proceed as before.

Common Oil Varnish.—Rosin, 4 pounds; Beeswax, (genuine,) ½ pound; boiled Oil, 1 gallon; mix with heat, then add Spirits of Turpentine, 2 parts.

Varnish for Gilded articles.—Gum-lac, Gamboge, Dragon's blood annoto, each 4 parts; Saffron, 1 part; dissolve each rezin separately, in 8 parts of Alcohol, and make separate tincture with the dragon's blood, and annoto also in 8 parts of Alcohol each—then mix the former together and add a sufficient quantity of the tincture to give the required shade, and colour the Varnish.

Varnish for Harness.—Take ½ pound of Indian Rubber, one gallon of Spirits of Turpentine,—dissolve enough to make it into a jelly by keeping almost new milk warm, then take equal quantities of good Linseed Oil, (in a hot state,) and the above mixture, incorporate them well on a slow fire, and it is fit for use.

A Varnish for fastening the leather on top Rollers in Factories.—dissolve 2¾ ounces of Gum Arabic in water, and add the same quantity of Sturgeon's Isinglass, dissolve in Brandy, and it is fit for use.

Varnish for Toys.—Copal, 7 parts; Mastic, 1 part; Venice Turpentine, ½ part; strongest Alcohol, 11 parts; dissolve the Copal first with the aid of a little Camphor, then add the Mastic, &c, and thin with Alcohol as required.

Varnish for Water Colour Drawings.—Take Canada Balsam, 1 part; Oil of Turpentine, 2 parts, mixed; size the drawing before you apply the Varnish.

Impermeable Varnish.—Boiled Oil, 100 parts; finely powdered Litharge, 6 parts; genuine Beeswax, 5 parts; boil until sufficiently thick and stringy, then pour off the clear.

Cheap Lac Varnish.—Shellac, 9 parts; Borax, 2 parts, water sufficient, boil until dissolved, and of a proper consistence.

Tar Varnish.—Tar, 2 gallons; Tallow, 1 pound; melt, then add ground Ochre, 7 pounds; Spirits of Turpentine, 6 pounds, mix well, by regulating the quantity of the Ochre, a very excellent Chocolate paint for rough out door work will be produced.

Turpentine Varnish.—Rosin, 1 part; boiled Oil, 1 part; melt, then add Turpentine, 2 parts; mix well.

White Spirit Varnish.—Strongest Alcohol, 100 parts; Sandarach, 25 parts; tears Mastic, 6 parts; Elemi, 3 parts; Venice Turpentine, 7 parts; dissolve in a closely corked vessel.

White Hard Spirit Varnish.—Gum Sandarach, 2½ pounds; Alcohol, 1 gallon; place them in a strong well closed vessel, and apply the heat of warm water with occasional agitation until dissolved, next add pale Turpentine Varnish, 1 pint, well mix, and let the whole rest for twenty-four hours.

To Clean Varnish.—Use a Ley of Potash or Soda mixed with a little powdered Chalk—do not make the liquor too strong of the Alkali.

To Polish Varnish.—Take 2 ounces of Tripoli, powdered, put it in an earthern pot with water to cover it, then take a piece of white flannel, lay over a piece of cork or rubber, and proceed to polish the Varnish, always wetting it with the Tripoli and water. It will be known when the process is finished by wiping a part of the work with a sponge, and observing whether there is a fair even gloss; when this is the case take a bit of mutton suet and fine flour, and clean the work.

LIST OF PATENTS FOR MARCH, 1846.

[CONTINUED.]

Improvement in BELTS for conveying Straw and Grain, by JOHN BLUE, of Covert, New York, Patented, March 14, 1846.

By forming endless belt of slats for carrying up and separating the grain from the straw by attaching or joining the alternate slats to those which are attached to the belts or chains, to form openings for the discharge of straw, grain, or foreign matter.

Improvement in HANGING CARRIAGES, by STARR FAIRCHILD, of Trumbell, Connecticut, Patented, March 14th, 1846.

The combination of the fifth wheel and springs, and stays suspended between the axles under the bodies of carriages.

Improvement in conveying, cleaning, and assorting COAL, simultaneously by a current of water, by JOHN G. BRANT, of Cumberland, Maryland, Patented, March 14, 1846.

Improvement in DYEING HAIR, WOOLS, &c., by DENISON WILLIAMS, of Albany, New York, Patented, March 14, 1846.

Improvement in TEA KETTLES, by EZRA RIPLEY, of Troy, New York, Patented, March 14, 1846.

Improvement in the CENTRIFUGAL PUMP, by WILLIAM D. ANDREWS, of New York, Patented, March 14th, 1846.

Improvement in STOP COCK, by THOMAS C. CLARKE, of Philadelphia, Pa., Patented, March 14, 1846.

Improvement in Fire and Water proof CEMENTS, by WILLIAM YATES and DENNIS DOLAN, of Manchester, England, Patented, March 14, 1846.

Improvement in HORSE RAKES, by SENECA LADD, of Vermont, Patented, March 14, 1846.

The mode of applying each of the teeth to the beam or head of the rake, is by the joint, spring, and staple in combination with each other, and acting together.

Improvement in GRAIN RAKES, by DAVID HARKNESS, of Raisin, Michigan, Patented, March 14, 1846.

By the affixing of the rake teeth or fingers in a shaft or head which is made to turn on gudgeons, in suitable bearings in rear of the axles, in such manner as to cause said axle to become a fulcrum for elevating the collected grain.

Improvement in coloring DAGUERREOTYPE PICTURES, by WILLIAM A. PRATT, of Alexandria, D. C., Patented, March 14; 1846.

By joining two or more portraits or portions of portraits together, and producing artificial back grounds on the glass, which, from their nature, cement *themselves* and the *glass* on which they are painted to the pictures, and which also enables the operator to produce any sized picture that his glass will allow, with even a small sized instrument.

Improvement in FAN BLOWERS, by ISAAC S. SMITH, of Orangetown, New York, Patented, March 14, 1846.

The construction and working of Fan Blowers, operated by auxillary engines for supplying the blast to the furnaces of steam-boilers; which elements consist of the increased diameter of the Fan Blower; and putting the fan directly on to the crank shaft of the auxillary engine.

Improvement in ABDOMINAL SUPPORTERS, by E. K. GALE, of N. York, Patented, March 14, 1846.

By combining the body spring and pad spring, so as to cause the pad at its lower edge to press inward and upward, while at the same time freedom is given to it.

Improvement in the ROTARY PUMP, by WILLIS H. JOHNSON, of Springfield, Illinois, Patented, March 21, 1846.

The combination of the circular revolving paddle plates with the cylindrical ring plates, and radical partitions.

Improvement in VENTILATING HATS, by RICHARD HALLORAN, of New York, Patented, March 21, 1846.

The forming of a Ventilating Hat, is by the means of hoops or bands combined.

Improvement in WICK TUBES for Lamps, by SAMUEL RUST, of New York, Patented, March 21, 1846.

The binding or forming of the tube, and inserting it into the stopper or lamp, as to place the edges of the tin or material out of which the tube is made on the centre or *middle part* of the *side*, and lengthwise of the tube opposite the roller, so as to form a spring of the edges.

Improvement in TRUSSES, by JACOB COOK and JOHN STRICKLER, of Strasburg, Virginia, Patented, March 21, 1846.

The combination of Pads.

Improvement in making VEGETABLE BEER, by SIMEON WHITON, of Hartford, Connecticut, Patented, March 21, 1846.

The combination of the four following ingredients or either two of them with cream tartar, pumpkin, nuts, and sweet corn.

Improvement in TRUSSES, by BENJ. W. STRATTON, of Philadelphia, Patented, March 21, 1846.

In combining the ratchet hinge with the truss pad and slide upon the flat spring.

Improvement in LADIES TRUSSES, by DAVID B. W. HARD, of Bethlem, Connecticut, Patented, March 21, 1846.

In forming a frame for support, which constitutes a narrow outer margin, and which, in the outlines of the form given, presents three sides--one side toward the left, and one side toward the pubis.

Improvement in CARRIAGE WINDOWS, by JAMES OGDEN and D. K. HART, of Troy, New York, Patented, March 21, 1846.

In having two or more divisions or frames with ledges at the top and bottom, so that by raising the lower frame all the others will be raised.

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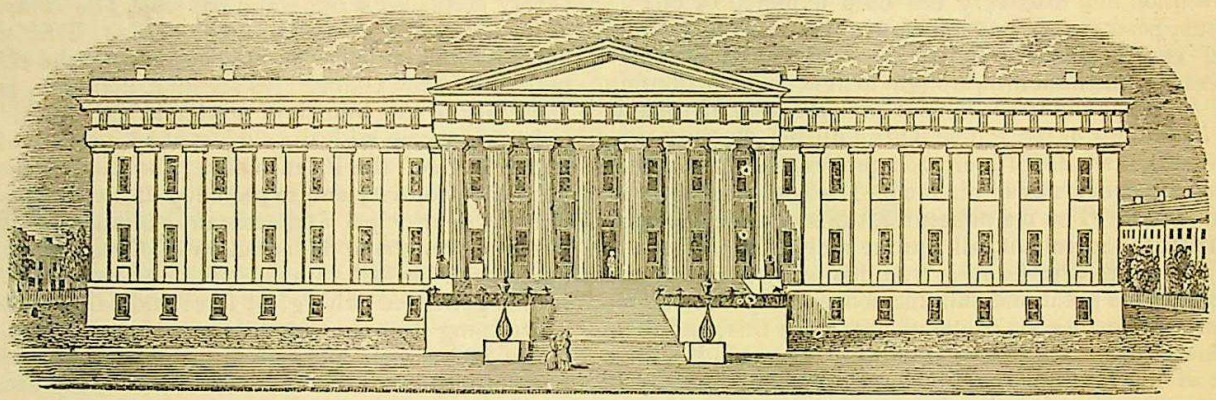
THE MIRROR OF THE PATENT OFFICE,

AND

AMERICAN JOURNAL

OF IMPROVEMENTS IN THE USEFUL ARTS.

WASHINGTON, D. C.



PATENT OFFICE.

REPORT

OF

THE COMMISSIONER OF PATENTS,

FOR THE YEAR 1846.

For those of our readers who do not have the opportunity of perusing the Annual Report of the Commissioner of Patents, we here subjoin an abstract of the very able and interesting Report of the Hon. Edmund Burke, for the year 1846, as read, and referred to the Committee on Patents, January 23, 1847.

The commissioner reports, that during the year ending December, 31, 1846, the whole number of applicants for patents received, was twelve hundred and seventy-two. The whole number of caveats filed during the same time was four hundred and forty-eight. The number of patents issued in 1846, was six hundred and nineteen, including thirteen re-issues, five additional improvements, and fifty-nine designs. During the same period, four hundred and seventy-three patents have expired. Three applications for extensions were made during the year; two of which were rejected, and one was still pending. Two patents were also extended by Congress.

The receipts of the office during the year 1846, including duties and fees paid in on application for patents, caveats, re-issues, additional improvements, extensions, and for copies, amounted in the whole to $50,264,16; of which sum, $11,086 99 were repaid on applications withdrawn, and for money paid in by mistake, as per statement marked A.

The expenses of the office during the year 1846, were as follows, viz: For salaries, $16,142,97; temporary clerks, $5,685, 61; contingent expenses, including postage and the fees paid to counsel in two suits in equity recently pending against the Commissioner, in the United States district court for the eastern district of Pennsylvania, $7,485 19, compensation of the district Judge, $100; library, 675 96; agricultural statistics, $3,610 68; amounting, in the whole, to the sum of $33,700 41, as per statement marked B.

There was also expended during the last year, under the act of March 3, 1837, for the restoration of records and drawings, the sum of $786 31, and for duplicate models the sum of $585, as per statement marked C.

The aggregate of expenditures under the different heads above enumerated, including money paid back on withdrawals, and for the restoration of records, drawings, and models, was $46,158 71, leaving a balance to be carried to the credit of the patent fund of $4,105 45.

On the first day of January, 1845, the amount of money in the Treasury to the credit of the Patent fund was $182,459 69, which, with the balance paid in during the year 1846, will, on the first day of January, 1847, amount to $186,565 14.

Although the balance which the Office has been able to place to its credit in the Treasury during the year just past, in consequence of the decreasing amounts received on application for patents, caveats, &c., (there being fewer foreign applications during the last year,) and the additional amount refunded to applicants on withdrawal of their claims, is not so great as that of the previous year, yet it is more than the average balance of former years,

and indicates the flourishing condition and prospects of the Patent Office.

Thus far the Office has more than sustained itself, and fully realized the anticipations of Congress when it was organized upon its present footing. And if a conclusion may be drawn from the activity of the inventive genius of our countrymen, as exhibited in past years, we may rely confidently in the belief that this useful and noble institution of the Government will never become a charge upon the Treasury.

On reference to the reports of the two principal examiners, it will be seen that the year just past has not been without its valuable discoveries, which, if they do not surprise and delight the mind with their novelty and brilliancy, will contribute much to the convenience and welfare of man. It will be seen that almost every field of invention and discovery has been explored by our ingenious, persevering, and indefatigable countrymen, and many very valuable improvements in machinery, and processes of manufacture, brought to light; all contributing more or less to the improvement and progress of society. The operations of the Patent Office during the past year prove, as the circular of every year proves, that the inventor is ever the benefactor of his race. His genius bestows its favors on all. The manufacturer, the mechanic, the agriculturist, the merchant, all are the recipients of the benefits which are ever flowing from his toils, energies, and sometimes his great and sublime conceptions. No theme is more interesting for contemplation than this, and there is none which more deeply impresses the mind with a sense of the continued and onward progress of society in the grand career of civilization.

The Commissioner, in his last annual report, embraced the occasion to bring to the notice of Congress the embarrassed condition of the Patent Office, in consequence of the great increase of its business, without a corresponding increase of its clerical force, particularly in its scientific department.

When the Office was reorganized in 1836, the Commissioner was allowed but a single examiner. By the 11th section of the act of March 3, 1837, an additional examiner was authorized to be appointed; and by the act of March 3, 1839, two assistant examiners were provided for; since which time no addition to the examining corps has been authorized, and none has been made.

In 1840, the first complete year after the last addition to the examining force was authorized, the number of applications for patents received was 765, the number of caveats filed 228, and the number of patents granted 475.

During the year 1846 the number of applications for patents was 1,272, the number of caveats filed 448, and the number of patents granted 619. During the same year the number of applications for patents which were examined and rejected was 398.

Thus does it appear that, since the last addition to the examining force in 1839, the business of the Office has increased nearly one hundred per cent. It has increased beyond the physical ability of the present examiners and assistants to keep up with it, although constantly and industriously engaged in the performance of their onerous and fatiguing duties. The consequence is, that business accumulates upon their desks; applicants are delayed in having their cases examined, often to their great detriment, and always to the injury of the Office; which is complained of for its delays by persons not knowing the condition of its business and the inadequacy of its force, when it is constantly exerting itself to the utmost to accommodate the public, as well as to relieve itself from inconvenience resulting from a pressure of its duties.

When it is considered that the Patent Office derives its revenues entirely from the inventors, and sustains itself without charge upon the Treasury, the justice of their complaints cannot be denied nor evaded. And the Commissioner suggests, whether, in view of the fact that its revenues are ample for the increased expenditure, which will in that event be required, it is not expedient for Congress to authorize the addition to the examining corps, which the present state of the business of the Office imperatively demands.

By the 11th section of the act of March 3, 1837, the Commissioner is authorized to employ all necessary temporary clerks for writing and copying, at a compensation of ten cents for every hundred words. This provision enables him to provide for any exigency in the clerical department of the Office. No addition, therefore, is deemed necessary to this branch of service in the Office.

In connexion with the subject of an increase of the scientific force of the Patent Office, the Commissioner suggests the propriety and expediency of increasing the salaries of the principal and assistant examiners. This subject was brought to the attention of Congress by his predecessor in his last annual report, and its expediency and justice portrayed with great force and earnestness.

Deeming it unnecessary to repeat the reasons in favor of the proposition, the Commissioner refers to his last report for all the information which is thought necessary to enable Congress to come to a correct conclusion in relation to the subject.

The Commissioner again adverts to the able and interesting reports of the examiners attached to the reports of the Commissioner for the last two years, and to the present report, for proof of the talents and scientific qualifications requisite to enable the incumbents to fill those laborious and responsible desks with credit to themselves and usefulness to the country. The remark may be safely hazarded, that there are but very few offices in the Government which require more ability for sound and nice discrimination, more extensive and varied acquirements, and, it may be added, more inflexible integrity of character, than the office of examiner of patents. The revenues of the Patent Office are ample for the proposed increase of force and salaries in the examining corps; and the interests of the public, as well as of the inventors, require that it should be made.

In his last annual report the Commissioner submitted to Congress a proposition for certain modifications of the existing patent law, which he deemed important and necessary for the protection of the inventor as well as the public. A bill, embodying most of the modifications suggested was reported in each House by the committees having the matter in charge, but in consequence of the great amount of business pressing upon Congress at the last session, it failed to become a law.

The bill provided for two important and essential changes in the existing law in relation to patents. One of those provisions was, that in all suits brought by the patentee for infringements of his invention, the letters patent securing his invention should be received by the courts trying the same as conclusive evidence of his right to recover damages, until they were set aside by the insti-

tution and prosecution to final judgment of a process for their repeal. The other was a provision for the institution of a process for the repeal of letters patent which had been obtained by fraud, misrepresentation, or upon false suggestions, or which were void, in whole or in part, for want of novelty, or other cause. The very inadequate protection afforded to the patentee by the present law, seems to me to furnish sufficient reason for the proposed modification.

After the rigorous and searching ordeal through which every invention passes at the Patent Office, it certainly seems reasonable that the letters patent, under the seal of one of the offices of the Government of the United States, should be received in courts of justice as conclusive evidence of the title of the patentee to his invention, and his right to recover, until his patent shall have been revoked and annulled for good and sufficient cause, by a tribunal competent to investigate the matter.

But the present law extends no such protection to the patentee. At present his letters patent are only *presumptive* evidence of the novelty of his invention, and of his right to recover. Consequently, the validity of his patent may be, and for the purposes of embarrassment often is, put in issue in suits for infringement, and he is compelled to prove the novelty of his invention over and over again, as often as the depredator upon his rights, whom he seeks to punish, is disposed to put him to that trouble. Many instances of this wanton aggression upon the rights of the meritorious inventor have come to the knowledge of the Commissioner since he has been at the head of the Patent Office. And many of these instances of aggression proceed from wealthy and powerful companies and corporations, and the subjects of them are the inventors of the most useful and valuable machines and improvements. The more valuable the invention, the more liable is it to piracy and infringement. These wealthy and powerful bodies know well the benefit to them of the law's delay, and the ruinous expense to the single-handed individual who dares to resist their unlawful and unjust invasion of his rights; and hence, in the end they hope to win, either by the defeat of the patentee by means of some trifling defect in his title deed, or his inability to procure the necessary evidence to substantiate his right, or by a compromise, in which he will be forced to sacrifice a portion of his claims in order to relieve himself from the embarrassment and expense of the unequal contest. As the law now stands, the great burden of the controversy falls upon the patentee, and not upon the wanton violator of his rights, as it should.

In this view of the matter, the Commissioner thinks all candid men will agree, that when a patentee has established, in the judgment of the office or tribunal whose duty it is to pass upon his claims in the first instance, a right to letters patent of the United States, that document should be his shield and protection until it is shown by others, who dispute his title, that he has no right to it.

The Commissioner states that there is a prejudice existing, to some little extent, in the minds of a portion of the community, against the claims of inventors. It is contended by some, that patents securing exclusive rights to the discoverers of new machines or processes of manufacture are monopolies, operating to the detriment of the best interests of the community, and existing against the true policy of all just governments; and, therefore, are to be regarded with suspicion, construed with great strictness, and defeated if possible. But on a little reflection such a view of the rights of inventors will disappear from the minds of candid and reasonable men. What are the grounds on which all civilized and enlightened governments grant to persons making valuable discoveries in the arts and manufactures a limited monopoly of the benefits of their inventions? The main ground is to encourage discovery and invention—those great agents of social improvement—by securing to those who make them the profits which result from them, in order to enable them to remunerate themselves for their toils and expenditures, and to induce others to explore the vast and limitless field of invention. Every new discovery in science and art contributes to the wealth, convenience, and comfort of individuals, and to the improvement of society. Some of the inventions of the last few centuries have burst upon the world with the brilliancy of the morning sun, changing the whole aspect of society, and conferring incalculable benefits upon the human race: the art of printing, the discovery of gunpowder, the steam engine, the cotton gin, the spinning jenny, the power loom, the steamboat, the railroad, and the magnetic telegraph. These great discoveries in science and art have revolutionized the condition of the civilized world, and their influence at this moment is probably more potent and more sensibly felt than ever before.

These great discoveries are striking instances of the effect of the labors of the inventor upon society and civilization; and there are others of less note, producing their due influence upon the condition and welfare of the world. Even the most humble discovery contributes its due proportion to relieve society of its burdens, and administer to its comforts, and to accelerate and aggrandize its unceasing and triumphant progress in the improvement of its condition, and the expansion and perfection of its lofty nature and destiny. Therefore, there is ample reason why society should reward and encourage that class of its benefactors, by securing to them, for a limited term, the exclusive enjoyment of the fruits of their genius and labors.

But it cannot be denied that, upon the principles of abstract justice, the inventor has a complete and unquestionable claim to the fruits of his discoveries until his labors and sacrifices are adequately remunerated. Many valuable and profitable discoveries in the arts are the result of a sudden and lucky conception in a happy moment; but most of them are the fruits of days and years of incessant toil, anxious and harassing thought, and great and pecuniary sacrifices. This toil, this mental effort, and these pecuniary sacrifices, establishes a title to the product which is their offspring, as sacred and irrefragable in the eye of justice as the title to his farm, his workshop, or his merchandise, which a man has acquired by his labor, skill, and economy. So clear and convincing is this view of the right of the inventor to the fruits of his genius and labor, that argument in its support would seem to take from its strength. Yet the reasons are equally strong that the inventor's exclusive enjoyment of his discovery should not be perpetual, but should be permitted only for a limited period.

All inventions, great and small, generally have their period of birth, growth, maturity, and perfection, if the latter term be allowable. And if one mind conceives and gives birth to the first idea, many assist in its development and expansion. Probably no piece of mechanism was

ever made which was perfect in all its parts at its first creation. The steam engine is an interesting and beautiful illustration of the gradual progress of an invention, from its first conception in the mind of the inventor to its present wonderful state of perfection and efficiency. It first appeared in a rude form, unwieldy and dangerous to those who dared to operate it—a thing designed more for experiment than utility; and now, after passing through nearly two centuries of improvement, and taxing the highest intellectual energies of thousands of ingenious and skilful men, it appears to us with a perfection, in the nice and delicate adjustment of its machinery, which astonishes and delights us, and an efficiency and power of action which enable it to confer the greatest and most lasting benefits upon mankind.

The history of this wonderful engine and instrument of civilization shows as clearly and conclusively that the claims of the inventor to the fruits of his genius should not be perpetual, as it does that he should be permitted to enjoy them until he is adequately remunerated for his labor and expenditures. For, if his right to his invention were perpetual and exclusive, no other person could improve it, because he could not use his improvement with the original invention, and therefore not at all. This would immeasurably retard, if not wholly prevent, all improvement of original inventions, and would result in incalculable injury and mischief to society.

Hence, while admitting the unquestionable justice of the claim of the inventor to the fruits of his genius for a period of time sufficient to enable him to remunerate himself adequately for his toils and expenses, it is absolutely necessary, for the progress of improvement and the welfare of society, that his exclusive right should then cease, and his invention become the common property of the public. Others will then have an opportunity to remedy the defects of, and to improve and perfect his original creations. And, in accordance with this view of the subject, the Constitution of the United States authorizes Congress to enact laws for the promotion of the useful arts, and the protection of the inventor in the enjoyment of the fruits of his genius and skill for a certain period, the duration of which is limited to fourteen years; at the end of which time, in consideration of such protection, his invention, and the secret of it, shall become the property of the public.

The Commissioner thus particularises the general principles of the Patent law, because, as before remarked, a prejudice prevails to some extent in the community against the justice of the claims of the inventor to temporary protection in the enjoyment of the fruits of his labors. Juster sentiments, however, are growing more prevalent in relation to the rights of that valuable and meritorious class of citizens. During the past year courts of justice have displayed a more earnest desire to give protection to the inventor, as evinced by the liberal construction which they have given to the present imperfect patent law, whenever questions relating to patents have come before them for adjudication.

The bills reported by the respective committees of the two Houses contained other provisions less important than the two which I have been considering, deemed, however, to be necessary modifications and improvements of the existing law in relation to Patents; but as they were particularly explained in a former report, it is unnecessary further to consider them.

In connexion with the subject of the amendment of the existing Patent law, the expediency of making some new provision in reference to the applications of the citizens and subjects of other countries for letters patent in the United States, is suggested by the Commissioner.

By the existing law a subject of Great Britain is required to pay into the Treasury a duty of $500 before his application can be examined. The citizens and subjects of all other foreign countries are each required to pay into the Treasury a duty of $300 on their respective applications. These duties were designed to bear some proportion to the duties required of American citizens making applications for patents in other countries, and on that ground may, perhaps, be justified and defended. The effect of this provision is unquestionably to prevent the introduction into this country of many useful and valuable discoveries, which would otherwise be patented and introduced. Similar high duties have the effect to exclude American inventions from other countries. Thus all countries are injured by this system of taxing genius for the exertion of its powers, in order to obtain comparatively a very small and trifling amount of revenue.

It affords no protection to the American inventor to keep out the discoveries of his foreign emulator (not rival) in the arts, by taxing the emanations of his genius with high duties, while the country would derive much benefit from their introduction.

Therefore, it is submitted whether it would not be expedient, if Congress should make the amendments to the Patent law already proposed, also to provide contingently for the reduction of the duties required on applications for patents by the citizens or subjects of foreign governments to thirty dollars, whenever it shall appear that corresponding reductions have been made by those governments of the duties required of American citizens? The Commissioner is of opinion that the proposition would be received with favor by some, if not all, of the European governments.

Congress, at its last session, having declined to make the usual appropriation for the annual Agricultural Report made by this office, accordingly no report of that character was made.

That a department or bureau of government should devote a portion of its duties to the important interests of agriculture, is no new thing in the history of nations. Most, if not all, of the leading governments of Europe have departments charged with these responsible duties, under the supervision of officers called Ministers of the the Interior. And such a department seems to have been contemplated by President Washington and the earlier statesmen of the Republic.

In the message of General Washington to Congress, in December, 1796, an agricultural, or home department, is commended by that revered and illustrious statesman and patriot. In 1812 it was again recommended in a most able and enlightened report, drawn up and presented to the House of Representatives by the Hon. Adam Seybert, chairman of the select committee appointed to inquire into the state of the Patent Office. And again, in 1817, the subject was considered by a select committee of the House of Representatives, which, through one of its members, the Hon. M. Hurlbert, reported in favor of the establishment by Congress of a National Board of Agricul-

ture. The views of the committee were expressed in the following brief but emphatic language:

"The extent of territory, and the richness and consequent productiveness of the soil of our country, can never fail to invite and employ in the cultivation of the earth far the greater portion of American industry.

"The interests of agriculture must, therefore, be primarily important to the people of the United States, and must at all times deserve the warm support and liberal patronage of Government. The committee observe with pleasure, that President Washington, in his speech to Congress of the 7th of December, 1796, recommended to that body the interests of agriculture, and the establishment of a national board to promote the same.

"In different parts of Europe, as well as in several States of this Union, such boards have been instituted under the auspices of government, and have diffused much useful information, and contributed largely, as the committee believe, to the public welfare.

"After due consideration of the subject, the committee are of the opinion that it is advisable to establish at the seat of Government a national board of agriculture, and report a bill for that purpose."

It is not recommended, nor is it desired by the Commissioner, that any such department, or national board of agriculture, should be instituted by this Government. The practices of other enlightened governments are referred to only to show that the exercise of such functions by government is not without precedent, nor without utility.

The concurring testimony of a very large number of intelligent citizens from every State and district in the Union received at this office, furnishes convincing proof of the beneficial influences of the agricultural reports of the Patent Office. They have been distributed, through the agency of Congress, to every district in the Union; they have penetrated every neighborhood, and been read in almost every family; and they have awakened an interest upon the subject of agriculture among the intelligent farming classes of our population not before exhibited nor felt. If they have not always led to efforts to improve, they have produced in the mind even of the humble agriculturist a conviction of the true dignity of his noble avocation, and of its first and transcendent importance among the great interests of his country. If they had produced no other effect, the money which they cost would not have been idly expended.

Nor should it be forgotten that it is the only expenditure which has been made by Congress for the especial benefit of the agricultural classes; the only expenditure for an interest in the pursuits of which tenfold the amount of capital is invested that is invested in any other pursuit; many times the amount of value annually produced that is produced by any other interest; and many times the number of persons employed that are employed in all the other great interests of the country put together. Yet, how much is expended, and how much time is employed, in legislating for those other interests, and how little for agriculture!

A.

Statement of receipts for patents, caveats, disclaimers, improvements, and certified copies, in 1846.

Amount received for patents, caveats, disclaimers, and improvements	$48,765 00	
Amount received for copies	1,499 16	
		$50,264 16

B.

Statement of expenditures and payments made from the patent fund, by the Commissioner of Patents, from January 1 to December 31, 1846, inclusive, under the act of March 3, 1839.

Brought over,		$50,264 16
Deduct paid on withdrawals, and money paid in by mistake refunded		11,086 99
		$39,177 17
For salaries	$16,142 97	
For temporary clerks	5,635 61	
For contingent expenses	7,485 19	
For the compensation of district judge	100 00	
For the library	675 96	
For agricultural statistics	3,610 68	
		33,700 40
		$5,476 77

C.

Statement of expenditures on the restoration of the Patent Office, under the act of March, 3, 1837.

For restoring the records and drawings	$786 31
For duplicate models, including model cases	585 00
	$1,371 31

RECAPITULATION.

Amount of receipts from all sources		$50,264 16
Amount paid on withdrawals, as per statement A	$11,086 99	
Amount paid for salaries, &c., as per statement B	33,700 41	
Amount paid for restoration of records, &c., as per statement C	1,371 31	
		46,168 71
Leaving a net balance to the credit of the patent fund of		$4,095 45
Balance in the Treasury to the credit of the patent fund, January 1, 1846		182,459 69
Balance to the credit of the patent fund, January 1, 1847		$186,555 14

INSTRUCTIONS TO PATENTEES.

1. *Caveats.*—Caveat papers cannot, under *any circumstances*, be withdrawn from the office, nor undergo any alteration after they have been once filed.

2. Additional papers relating to *the invention*, may be admitted under the same file, the date of the reception of such papers being noted.

3. In case of filing papers additional to an original caveat, the right to notice of such papers expires with the caveat; and any additional papers, not relating to the invention as first caveated, are not entitled to notice.

4. Caveat papers once filed cannot be inspected by the caveator, nor any other persons than those duly authorized by law to examine such papers.

5. The caveator, or other person properly authorized by him, may at any time obtain copies of the caveat papers at the usual rates.

6. It is desirable that caveats should be explicit as to the character and features of the invention—embrace suitable drawings and sketches, and a model if convenient. The caveat fails of its purpose when the invention is not explained.

7. Models are always retained by the office.

8. Applications are examined in the order of their reception, except in cases in which the claims so nearly resemble those undergoing examination, as to render an interference probable; in which case they will be taken up and examined with the cases then under examination.

9. Rejected applications may be reconsidered at the request of the applicant, and explanations, whether verbal or in writing, may be at any convenient time received by the examiners; but final action upon any such cases cannot be had until they come up in their turn as cases presented anew.

10. In case specifications and drawings should be found defective, they are returned to the applicant with instructions to amend. When returned to the office they are again examined, the examinations in such cases taking precedence of all new cases on hand at the time of their reception. But if on such examination it should be found that the instructions to amend have been disregarded, or not properly attended to, the papers are again returned to the applicant, and upon their second return to the office, the examination of such papers is delayed until all the business on hand at the time of their reception is disposed of.

11. When papers are thus returned to applicants for amendment, should they find it necessary, or deem it important, to prepare a new document, in order to make suitable amendments, *the original papers must be returned to the office, together with the amended or new papers*, otherwise examination upon such cases will be delayed until the original papers are received by the office.

12. After an application has been examined, no alteration made in the character of the invention can be considered under the same fee; but such alterations will require a separate fee, papers, &c, before examination can be had.

13. In general, if any addition is to be made to an invention duly before the office, or any change in its character, the applicant must withdraw and file his application anew.

14. All explanations or suggestions by patent agents, in relation to cases pending before the office for examination, must be in writing, addressed to the Commissioner.

15. All patents will be delivered or sent by mail to the patentee, except when a *written order* has been deposited by him in the Patent Office, directing the delivery to some other person.

16. When an application has been *finally decided*, the office will retain the original papers, allowing the applicant to obtain copies thereof.

FOREIGN PATENTS AND RE-ISSUES.

Applications for inventions, *which have been patented* in a foreign country, will be taken up for examination immediately after all the necessary papers and drawings have been filed, the fee paid, and the model deposited in the office. As the letters patent issued in this country for inventions patented abroad bear date with the foreign letters patent, this rule has been adopted with the view of giving the longest term of time to the patent in this country. For a similar reason, applications for the surrender and re-issue of letters patent will be examined immediately after they shall have been completed.

PATENT AGENTS OR ATTORNEYS.

In this city, and in some of the other cities of the Union, individuals have undertaken the business of preparing applications, drawings, &c., for procuring patents, under the professional title of "Patent Agents," or "Patent Attorneys;" from which circumstance many have supposed that such persons have some connection with the Patent Office, official or confidential.

It has also come to the knowledge of the undersigned, that some individuals, officiating in the character of Patent Agents, have pretended to possess an influence with the Patent Office not accorded to others, by which they are enabled to obtain Patents in cases in which they have been refused to others; and also, that persons acting in the character of Patent Agents have charged the result of their own inattention, perhaps incompetency, to the negligence of the Patent Office.

These circumstances render it necessary for the undersigned to advise all persons having business with the Patent Office, of the precise relations which Patent Agents hold with this Office.

The Patent Office recognises no official or confidential relations with Patent Agents or Attorneys whatever. It does not concede to them any favors or privileges which are not granted to all other persons; and any pretensions to the contrary (if any such are made) are, of course, without foundation.

The only class of agents employed by the undersigned are those persons who have been authorized, in several cities of the Union, to receive and forward models, &c., to the Patent Office, and their connexion with the office begins and ends with that employment only.

This explanation is not made with any design to reflect upon such persons as have undertaken the business of Patent Agents in this city, or elsewhere, but only with the view of vindicating the Patent Office from any imputation which may grow out of the circumstances above alluded to, and of asserting the integrity and impartiality of its administration, which challenges and defies the most rigid scrutiny.

To relieve applicants from the necessity and expense of employing agents to transact their business with the Patent Office, so far as it is in the power of the Office to do so, the examiners are instructed to decide the questions of the novelty and patentability of inventions upon papers imperfectly prepared, if they are sufficiently perspicuous to enable them clearly to understand the invention claimed, *when such papers are prepared by the inventor without the intervention of an agent.* But if an agent be employed, it being presumed that he is qualified for the business which he undertakes, and needs not, nor is entitled to, instructions in relation to it, the Office (which has not the time, nor is bound by law in *any* case to give instructions) will, in all cases, leave it to him to prepare and present the claims of the applicant, and will decide upon them as they are presented.

Inventors, who are desirous of examining the models in the Patent Office before making application, should carefully avoid all persons hanging about the Office, and offering their services as agents, or to examine models; but they should in all cases apply to the Commissioner, or chief clerk, who will direct the machinist to aid them in making a thorough examination of the models belonging to the class of inventions which they desire to see. This caution is given to enable inventors from abroad to avoid the misinformation and impositions to which they are exposed from persons lying in wait for them about the Patent Office, and tendering their services as Patent Agents, or the procurers of Patent Agents. If the services of Patent Agents are desired, able and competent persons engaged in that business can be found *at their offices* in this city.

EDMUND BURKE, *Comm'r of Patents.*

(For the Mirror of the Patent Office.)

BIOGRAPHICAL SKETCHES.

BENJAMIN FRANKLIN.

BY THOMAS G. SPEAR.

[CONCLUDED.]

In December, 1774, Dr. Franklin received the petition of the first Continental Congress to the King. When it came up before both Houses of Parliament for consideration, it was rejected by an overwhelming majority, after a heated debate, in which the ministerial members spoke contemptuously of the Americans and of their pretended grievances, and insisted on reducing them to obedience at all events, and by force of arms, if necessary. Dr. Franklin used all the means in his power to produce a change of measures, in which he was nobly seconded by Lord Chatham. These efforts were unavailing, and Dr. Franklin sailed from England the 21st of

March, 1775, and arrived in Philadelphia, on the 5th of May. He employed himself on his voyage in writing an account of his recent attempts to establish peace and harmony between the two countries. He also made experiments with a thermometer to ascertain the temperature of the ocean, by which he found that the water in the Gulf Stream is warmer than the sea on each side of it. This was a philosophical discovery, his theory of which is not yet invalidated.

The next day after his arrival, Franklin was unanimously chosen a delegate to the 2d Continental Congress. The news of the conflict at Lexington and Concord, between the British regulars and yeomanry, and the defeat of the former, threw the whole country into a state of extreme agitation; and the blood of American freemen having been shed on their own soil, by a wanton exercise of military power, when the second Congress assembled, this rash act dissolved the charm which had hitherto bound the affections of many conscientious Americans to the British Crown. The hour of trial had come, and a large majority of Congress, and of the nation, were ready to meet the contest by prompt and decided measures of resistance. Among the foremost was Franklin. He was on the Committee that reported the last petition to the Crown, to give Great Britain one more chance of recovering the friendship of the Colonies. Preparations for military defences proceeded at the same time, and Franklin was Chairman of the Committee of Safety. His time was never more fully employed. He drew up and presented to Congress a plan of Confederation, which served as a basis for a more extended plan, when Congress were better prepared to consider the subject. Franklin was now 69, and notwithstanding his advanced age, he took part in almost every important public measure, with all the ardor and activity of youth. He was placed at the head of the Commissioners for Indian Affairs, and few of the younger members served on so many Committees, requiring energy, industry, and close application. He was on the Committee for devising ways and means to protect the Commerce of the Colonies; for reporting on the state of trade in America, and on Lord North's motion in Parliament; for employing packet ships and disposing of captured vessels; for establishing a War Office; for drawing up a plan of treaties to be proposed to foreign powers; for preparing the device of a National Seal, and many others. A *Secret Committee* was appointed, of which he was a member, to attend to all things relating to military supplies and their distribution. He entered deeply into the subject of the financial business of the nation, and some of his propositions, rejected at first, were finally adopted. He was one of the Committee deputed to proceed to the camp of the Commander in Chief, and confer with several New England delegates on the most efficient mode of continuing and supporting a Continental Army, when a system was matured which proved satisfactory to Gen. Washington, and effectual in attaining the object. During his absence at Cambridge, Massachusetts, he was chosen a representative for the city of Philadelphia, in the Assembly of Pennsylvania, and was now a member of three most important public bodies which convened daily for business,—Congress, the Assembly, and the Committee of Safety. As soon as Congress had put their military affairs in train, they began to think of foreign alliances, and appointed a *Committee of Secret Correspondence*, in which Franklin acted a principal part. It was for the purpose of establishing and keeping up an intercourse with the friends of the American cause in Europe. He was one of three Commissioners sent to Canada, with full powers to regulate the operations of the army, and especially to assist the Canadians in forming a civil government, and to pledge all the support and protection that could be rendered by the united Colonies. But Montgomery had fallen under the walls of Quebec, and the American army had already began its retreat, and Dr. Franklin's health was much impaired by the hardships of the journey. On his return in June, however, he gave his undivided attention to the National Councils in Congress. A large majority of the nation was now prepared for Independence, and Franklin was one of a committee of five chosen to prepare a Declaration, which was drafted by Thomas Jefferson, and, after three days' debate, passed on the 4th of July, 1776, when the United States became an independent nation.

A convention now met to form a Constitution for Pennsylvania, of which Franklin was chosen President. He was in favor of a single legislative Assembly, instead of two branches; and it is generally supposed that the Constitution then passed was approved by him, as he subsequently defended it when some alterations were proposed. A verbal message from Lord Howe, the commander of the British forces was received, intimating that he would be glad to confer with some of the members of Congress in their private characters, at such time and place as they might appoint. Dr. Franklin, was appointed one of a Committee of three for that purpose. The conference took place at Staten Island, opposite Amboy, but ended without effecting anything, and was the last attempt at British "armed negotiation," in America. It being decided in Congress to proffer France a Commercial treaty, mutually advantageous, three Commissioners were appointed, with instructions, composed of Dr. Franklin, Silas Deane, and Arthur Lee. Deane was in France, Lee in England, and Franklin sailed on the 26th of October, 1776, to fulfil his last great mission, having raised all the money he could command, between three and four thousand pounds, and placed it as a loan at the disposal of Congress, to aid the cause of his country, previous to his departure.

After a boisterous passage of 30 days, Franklin arrived in France, where he was received with enthusiasm by the people, and with marked civility by the Court of Marseilles; and though ten months elapsed before it manifested any disposition to engage openly in the American contest, yet, as the tide of affairs began to turn in favour of the arms of the latter, treaties of assistance and alliance were signed at Paris, 6th February, and soon after ratified by Congress. A French historian, of celebrity, speaks of Franklin's appearance at this time, as follows: "He associated with all the distinguished personages who directed public opinion. Men imagined they saw in him a sage of antiquity, come back to give austere lessons and generous examples to the moderns. They personified in him the republic, of which he was the representative and legislator. They regarded his virtues as those of his countrymen, and even judged of their physiognomy by the imposing and serene traits of his own. Happy was he, who could gain admittance to see him in the house which he occupied at Passy. This venerable old man, it was said, joined to the demeanor of Phocion the spirit of Socrates. Courtiers were struck with his native dignity, and discovered in him the profound statesman. Young officers, impatient to signalize themselves in another hem-

isphere, came to interrogate him respecting the military condition of the Americans." In fact, the importunities of volunteers from all parts of Europe, to serve in the American army, was a source of much embarrassment to Franklin, to few of whom he could give the encouragement they desired. Among these, was the Marquis de La Fayette, whom he recommended to Congress, and whose career was signally advantageous to Washington and his compatriots. When Franklin, with the other American Commissioners, attended the Court, his dress was that of an American farmer. "His straight, unpowdered hair, says Madame Campan, "his round hat, his brown cloth coat, formed a sigular contrast with the laced and embroidered coats and powdered and perfumed heads of the courtiers of Versailles."

The British Ministers began now to be convinced that the war was likely to be much longer and more serious than they had apprehended, and despatched commissioners to treat with Congress for terms, and by secret agents made advances to Dr. Franklin for the same end. He proudly answered that peace could not be expected while Ministers continued to maintain that the power of Parliament over his country was absolute and unlimited, and their propositions as so many benefits for which compensation was demanded; and moreover, that peace was impossible while a war was waged against France, on account of her alliance with America, and that no treaty could be made with her but as an independent nation.

Dr. Franklin had now been 18 months in Paris, and had attracted around him a large number of personal friends, among them some of the most distinguished men in France. An expressed wish to see the American Philosopher by Voltaire, then at Paris, old, sick, and dying, was complied with, and an interesting conversation conducted between them in English, took place at Voltaire's residence. Congress now seeing the inexpediency of employing three Commissioners, in a service which might be discharged with equal facility and less expense by one, appointed Dr. Franklin Minister Plenipotentiary to the Court of France, on the 14th of September, 1778. Means had been made use of to embarrass his proceedings and injure his character, by Arthur Lee and Ralph Izard, which only recoiled upon their own heads.

Ever ready to promote what could be useful to mankind, he wrote circular letters to the commanders of American Cruisers, to afford all assistance in their power to Captain Cook, the Navigator, on his voyages, if they should meet with him; and also granted a passport to a vessel laden with supplies for the Moravian Missionaries on the coast of Labrador. Notwithstanding his laborious duties in the public service, in 1779, he read a paper on the Aurora Borealis to the Royal Academy of Sciences, in which he seeks for the cause of this phenomenon in electricity. An edition of his miscellaneous and political writings were published in London, the same year.

He opposed privateering as violating the code of morality, which ought to be sacredly observed by every civilized nation, and in a treaty, subsequently made by him between Prussia and the United States, which was his last official act in Europe, he had the satisfaction of having an article against privateering inserted, of which Washington observed, "It is the most liberal treaty which has ever been entered into between independent powers. It is perfectly original in many of its articles; and, should its principles hereafter be considered as the basis of connexion between nations, it will operate more fully to produce a general pacification, than any measure hitherto attempted amongst mankind."

In 1781, his arduous duties and the infirmities incident to age, led him to request his recall of Congress, and the appointment of a successor, which Congress declined, at the same time enlarging his commission for negotiating a treaty of peace, by joining with him John Adams, with three others. This new mark of favour was a sufficient rebuke to his enemies. His pieces, the *Ephemera*, the *Whistle*, and *Dialogue with the Gout*, were written during his residence at Passy, for the amusement of the little circle there.

In 1782, negotiations were entered into by Dr. Franklin and his coadjutors, for a treaty of peace, which terminated in its signature at Paris, by both parties, on the 30th November, 1782. It was applauded by the unanimous voice of the whole American nation. A definitive treaty of peace was afterwards, 1784, ratified between England, France, Spain, and the United States, and the drama of the Revolution closed. Franklin said, speaking of these 3 treaties, "A few years of peace, well improved, will restore and increase our strength; but our future safety will depend on our union and our virtue."

Public attention in France was at this time so much excited by the pretended wonders of Animal Magnetism, that the government deemed it a proper subject of inquiry; and nine Commissioners, selected from the members of the Royal Academy and the Faculty of Medicine, were appointed by the King to investigate the subject, with Dr. Franklin at their head. They reported "that no proof had been given of the existence of a distinct agent, called Animal Magnetism, and that all the effects, which had been exhibited, might be produced and explained by the ordinary action of the imagination upon the nervous system."

Dr. Franklin now repeatedly and earnestly solicited his recall, that he might spend the remainder of his days in the bosom of his family, and his only hope began to be that he might have strength to bear a voyage across the Atlantic. He finally embarked for America the last time, and arrived in Philadelphia, after a voyage of 18 days, on the 14th of September, 1785. He filled up his leisure hours during the voyage by writing a paper on *Improvements in Navigation*, another on *Smoky Chimneys*, and repeated his experiments in the Gulf Stream to ascertain the temperature of the seas, &c.

On his arrival in Philadelphia, letters of congratulation were sent to him from all parts of the country. General Washington and Mr. Jay were among the first to welcome him. The Assembly of Pennsylvania was then in session, and congratulated him in the most cordial manner on his safe return. The address presented to him by that body says, "Your services, in the public councils and negotiations, have not only merited the thanks of the present generation, but will be recorded in the pages of history, to your immortal honor. And it is particularly pleasing to us, to have the happiness of welcoming into the State, a person who was so greatly instrumental in forming its free Constitution." This address was followed by others, to all of which he returned brief and appropriate answers. He had been at home but a few days, when he was elected a member of the Supreme Executive Council of Pennsylvania, and when the Assembly again met he was chosen President of the State, the office being equivalent to that

of Governor of the other States, and chosen annually with unanimity for three successive years, the constitutional term. He was one of the Pennsylvania delegates to the Convention for forming the Constitution of the United States, which met at Philadelphia, May 1787, and continued in session four months.

He was apparently at ease in his private circumstances, and happy in his domestic relations. Whatever may have been the tenor of his opinions on points of faith and doctrine, there are many evidences of his reverence for religion and for the institutions of christianity.

After the expiration of his service as President of Pennsylvania, in Oct., 1788, he held no public office, although he was often consulted on public measures. His sensibility seems to have been touched by the neglect of Congress to settle his accounts, or even notice in any way his long and faithful services to the public. There is no apology for this neglect, nor does there appear any good reason why the business should not have been honorably adjusted.

At this time, 1789, Dr. Franklin was seldom free from acute bodily pain, but his mind never acted with more vigor, or maintained a more cheerful and equable tone. This is exhibited by several pieces which he wrote, one entitled *The Court of the Press*—another, a *Comparison of the Conduct of the Ancient Jews and the Anti-federalists of the United States*—another *A Plan for improving the Condition of the Free Blacks*. His last public act was to sign, as President, a Memorial of the Abolition Society of Pennsylvania, to Congress. The Stone, with which he had been affected several years, now confined him to his bed. During his weakness, an imposthume which had formed in his lungs, suddenly burst; and on the 17th of April, 1790, about 11 o'clock at night, he quietly expired, closing a long and useful life of 84 years and 3 months. At his funeral, which took place on the 21st of April, it was computed that more than 20,000 people were assembled. He was interred by the side of his wife, in Christ's Church Cemetery, at the South-east corner of Fifth and Arch streets, Philadelphia. A plain Marble Slab covers the two graves. On it is this inscription, as directed by his will:

BENJAMIN AND DEBORAH } FRANKLIN.

1784.

When the news of his death reached Congress, then sitting in New York, Mr. Madison, introduced a resolution, which was unanimously adopted, to wear the customary badge of mourning for one month, "as a mark of veneration due to the memory of a citizen, whose native genius was not more an ornament to human nature, than his various exertions of it have been precious to science, to freedom, and to his country." Similar resolutions were passed by the Executive Council of his adopted State, and public discourses delivered before various Societies. By a decree of the National Assembly of France, that body wore a badge of mourning for three days, and its President wrote a letter of condolence to the Congress of the United States. A Eulogy was delivered before the Commoners of Paris by the Abbé Fauchet. Other testimonies of veneration followed both in America and France, and elsewhere.

Dr. Franklin was well formed and strongly built, in his latter years inclining to corpulency; his stature was five feet nine or ten inches; his eyes were grey, and his complexion light. Affable in his deportment, unobtrusive, easy, and winning in his manners, he rendered himself agreeable to persons of every rank in life. The strong and distinguishing traits of his mind were sagacity, quickness of perception, and soundness of judgment. His imagination was lively without being extravagant. He possessed a perfect mastery over the faculties of his understanding and over his passions. Having this power always at command, and never being turned aside either by vanity or selfishness, he was enabled to pursue his objects with a directness and constancy that rarely failed to insure success, and the result is before an impartial world.

EPITOME

OF THE COMMISSIONERS' REPORTS.

Under this head it is the design to lay before our readers, at the earliest moment, a summary of the most important subjects patented during the year that are susceptible of description without illustration. Such others as do not appear here will be contained in other parts of the work, under their proper heads.

An authentic monthly Report of the Patent Office will be made, under the supervision of the Commissioner, together with drawings and descriptions of the subjects considered the most important of early communication to the public.

THE ARTS.

ANASTATIC PRINTING.

Among the notable inventions of the last year is one for printing from, or copying, all kinds of printed work, producing perfect fac similes of old works, and multiplying copies indefinitely. Such an invention cannot fail to excite deep and general interest, and even some alarm, when it is announced that an engraved bank note may be copied with perfect fidelity by the anastatic process. Should this be the case, which is somewhat doubtful, there is not so much to be feared in relation to forgeries as may at first sight be anticipated. *Forgeries* will be made in spite of all obstacles, and experience has shown that the amount of crime of this nature does not increase in proportion to facilities afforded by these so basely prostituted discoveries in science. For every advantage borrowed or stolen by the forger from the open hand of science, she holds in the other hand the checks for villainy—the guaranties of public protection.

For written notes and signatures a test paper is offered, with which neither chemical nor mechanical devices for erasure can tamper. For printed notes, she offers materials which will counteract the attempts to reprint by anastatic or any other process. As such facilities for reproduction and counterfeiting increase, they are met with corresponding increase of vigilance, and the chance of detection is not diminished. The extraordinary art of anastatic printing has been patented in this country to foreigners, and, as far as ascertained, has been practised with success in the city of London. The patent was granted for the process as hereafter given, and not, of course, for the result or principle. The credit of the discovery, and of the first successful production of copies from an engraving or other printed work, belongs to one of our own countrymen, Mr. Joseph Dixon, now of Mystic, Connecticut; and, according to the most creditable testimony, his results are far more perfect than any hitherto attained by others.* Mr. Dixon has

* Mr. Dixon's discovery is mentioned in a work entitled "Science applied to Domestic and mechanic Arts," by Rev. Alonzo Potter, published in 1841; and in the same work is given a specimen of Mr. Dixon's printing. This work was brought to notice after the completion of this report.

been for many years engaged in perfecting his art, and I can testify from personal knowledge of his success in this invention many years ago. But, as the office was not in possession of the details of his process, no reference could be made to him, and the patent was accordingly granted as above stated. It is possible that the two inventors have aimed at similar results by entirely different means; but be that as it may, it is but justice to a real inventor, and the well-earned reputation of our country in the promotion of the useful arts, that this mention should be made, and credit given where credit is so evidently due. The process of anastatic printing is substantially as given in the following description, viz:

"We lay the written or printed side on a clean piece of blotting paper, and wet the upper side equally by means of a soft brush, with a mixture of one part of nitric acid of 1.362 specific gravity, and eight parts of water by weight. So soon as the water has completely soaked through the 'original,' we lay it between sheets of blotting paper, and remove the excess of dilute acid by gentle pressure, and if the acid has equally penetrated the 'original,' we lay its written surface on the cleaned metallic surface, place double blotting paper over it, and pass it under considerable rolling pressure, which causes the acid to attack the metal where unprotected by the writing, drawing, printing, &c., on the original, and produce what we call a negative etching.

"Printed books of ten years generally require about 24 hours, and those of thirty to forty years some days; but after that age, no material difference appears to have taken place in the chemical condition of the printing ink. When we consider that the originals have been sufficiently acted on by the acid, we remove the cover and add water, so as to reduce the strength of the acid contained in each sheet, to such a degree as that it shall not act strongly or disagreeably on the tongue when brought into contact. We now lay the original between sheets of clean blotting paper, and subject them to slight pressure to remove superfluous moisture; we then lay it on the polished metallic surface as before described, and subject it to much greater rolling pressure than recent originals. If saving of time is an object, and when the originals have been very much indurated and dried, as in engravings, &c., we proceed by washing over the back of the original to be transferred with a solution of caustic potash, impure rain water, or distilled water, of about 1,014 specific gravity, which we prefer to carbonate of potash, as that substance would evolve gas in the next process; and when the original is fully soaked, we prepare a saturated solution of tartaric acid in water, in a shallow flat basin, or on a sheet of glass with a wax border to form tank sides; we then place the original, which has been soaked in caustic potash, in this solution, with the face to be transferred uppermost, and a re-action takes place between the tartaric acid and potash in the paper, forming crystals of cream of tartar, which appear over the whole surface, and are sparingly soluble in water, leaving only those parts which are protected with printing ink uncovered with crystals. We next roll a hard lithographic inking roller, charged with a small portion of ink, over its wet surface several times, and in several directions, until the black lines become revived by a new coat of ink, leaving the blank part of the paper covered with crystals almost untouched. We next remove the superfluous ink by a second application of a hard roller, uncharged with ink, and dissolve the crystals of cream of tartar by immersing the paper for some hours in dilute nitric acid, twenty parts water by one part acid of 1.362 specific gravity by weight; after which it is partially dried in blotting paper placed on the metallic surface, 'and subjected to slight pressure as before.'

"We remove the 'originals' from the plate after pressure, and wash the plate over in all directions with very thick gum-water, by means of a sponge, and next rub up or fill in the plate with a linen rag or sponge charged with a mixture of lithographic printing ink and gum-water, wherever it has been protected from the action of the acids, which operation of charging the plate constantly follows the continuous washing with gum, as it is usual for lithographic printers to charge their stones; and if the transfer has been not quite complete, or is from old work, this process should be repeated at intervals of one hour or more."

"What we claim is—

"First, the herein described process whereby we transfer by means of treating the 'originals' with acids of strength varying with the induration of the ink, and so pressing out the acid as to cause an etching of the blank spaces, and a reversed impression of the original, (where protected from the action of the acid,) or metallic surfaces.

"Second, the process of reviving the printing ink on originals, by first acting on them with caustic potash, or its carbonate, and tartaric acid, so as to form cream of tartar on the paper, which prevents the adherence of fresh ink in the blank spaces, while the old ink is left in a state to take up an additional quantity from a roller pressed over it.

"Third, the herein described process of preventing the adhesion of printing ink, during the operation of printing, to any part of the plates, which are required to remain blank, by acting upon such blank surfaces with acid preparations of phosphorus."—*Burke's Report*, 1846, *pages* 33, 34, 35.

TEST PAPER FOR NOTES, &c.

The invention patented under this caption, and before alluded to, consists of a colored or test sheet of paper, covered with a white sheet or surface, or a delicate colored sheet on one or both sides. "The object is to protect the test or colored sheet from being tampered with by any chemical agents employed to obliterate writings, and to prevent the using of any sharp instrument or rubbers for scraping or erasing writings, as, should any chemical agent be employed, the test, or colored sheet, would be so changed, as to alter conspicuously the former appearance of the paper, and the white or delicate sheet or sheets, surface or surfaces, would likewise be imbued with a stain or color produced by the action of those chemical agents on, and thence from the color of, the test sheet; the result, therefore, would destroy the appearance of both—videlicet, the outer white, or delicate colored sheet or sheets, surface or surfaces, and the test or colored sheet. This being done, it would be impossible to make the said safety and protective paper assume its original appearance, for if you attempted to whiten or renew the delicate color of the outer sheet or sheets, surface or surfaces, you would thereby completely destroy the appearance of the test or colored sheet; and if you attempted to color the test sheet, you would likewise produce a darker color on the white or delicate outer sheet or sheets, surface or surfaces. The one is a protection to the other. As to the application of any sharp instrument or rubber, for scraping or erasing writing, being employed, the effect produced would be such, that, when applied sufficiently to obliterate either a figure or word, the test or colored sheet would appear conspicuous, and the part disfigured could not be renovated; consequently the obliteration would always be detected."

"What I claim as my invention is the above described improvement or manufacture, or combination of a colored sheet of test paper, and one or more plain white, or lighter, or darker, or different colored sheets, or surfaces of paper, applied to one or both sides of the test sheet substantially as above specified."—*Burke's Report*, 1846, *pages* 35, 36.

TYPE CASTING.

Two patents were granted in 1845 for matrices for casting type; in one of which the inventor claims the method of bringing the mould to and from the nipple, by placing it upon what

he terms the crane, whose centres of motion are vertical, thereby allowing the mould a horizontal movement; also, as forming part of the arrangement of this crane, the adjustable socket for the upper centre; and the slide, with rod. Also, the combination of the slide and rod with the horizontal moving crane; the crane receiving its reciprocating motion from the combination of the crank shaft, cam, roller, connecting link, rocking shaft, and weight, or by other means substantially the same. Also, the arrangement of the adjustable socket for the upper centre of the crane, for adjusting the mouth of the mould to the orifice of the nipple plate, in combination with the crane.

The other claim reads as follows: Having thus fully described my method of forming matrices for casting the face of printers' type, and other articles therein, what I claim as new, and desire to secure by letters patent, is the manner of forming the same by means of a common type or cut, and a metallic plate with an opening, with slanting sides, the two arranged and prepared in the manner herein described, and placed in a solution of sulphate of copper, and connected with the pole of a galvanic battery, in the same manner usually practised in electrotyping; and after receiving a sufficient deposite of copper to be fitted up for use in the manner herein set forth.

TYPE-SETTING.

A great number of ingenious machines have been invented, both in this country and in Europe, to do away with human agency in type-setting, but thus far without success for any practicable purpose. So diversified are the uses for such a machine, that we doubt its ever being in the power of human invention to construct a machine to answer all these desirable ends. A patent was granted for an invention of this kind in 1845, by which the inventor professes to have remedied the difficulties heretofore met in arranging types upon a cylinder, and therefore made printing practicable by this method. The types (*of uniform size*) are of a pyramidal form, to adapt them to their position around the cylinder, and are held firmly together by means of rules or strips of metal fitting into whole recesses made in the types for this purpose." When the process of type-setting by machinery is fully attained, it may be *truly* denominated one of the greatest inventions of the age.

ELECTROTYPING.

A patent has been granted for an improvement in forming types by the electrotype process, which offers some facilities, although it would appear, in view of the rapidity and precision with which type-casting is performed, and the recent improvements in stereotype casting, that the electrotyping process cannot compete with them in point of economy.—*Burke's Report*, 1846 *p.* 33.

The art of *electrotyping* has not been before the office as the subject of application for a patent; but several specimens of silver plating upon iron work for harness show a highly improved condition of the art of plating by the galvanic method. The art promises to be ultimately of great value, though considerable difficulty has hitherto been experienced in laying on the precious metals to such a degree of thickness as to prevent acids and corroding solutions from getting at the inferior metal underneath. The moment this takes place the whole work is rapidly destroyed, the acid working under, and entirely removing the deposite of gold or silver, and acting with greater energy upon the inferior metal, from the fact that it is in contact with a metal of an opposite electrical character, which forms a galvanic series, and facilitates the attack upon the most oxidizable metal. This art, sometimes called the galvanoplastic art, has been abused by the vicious for the purposes of counterfeiting the precious metals; but there can be no truth in the prevailing opinion that bank notes have been counterfeited by the aid of this art, in conjunction with the daguerreotype process. It is supposed that a bank note is first copied by the daguerreotype of the normal size of the note; and the plate upon which the copy is thus taken is etched by chemical action, and thus made to produce *fac similes* of the original. The difficulties in the way of such a procedure are seemingly insuperable, and are as follows:

Firstly. No arrangement of lenses ever known can produce an image perfect in all its detail and proportions of the normal size of the object.

Secondly. No process of etching a dagurreotype impression has ever been devised to produce engravings equally perfect with the original.

Thirdly. Bank note engraving is the most difficult of all kinds to imitate, from the minuteness of detail. And,

Lastly. As the ink required to produce a tolerable impression from an etched dagurreotype must be of a peculiar kind and color, there would be an extreme difficulty in producing an imitation passable even with the most ignorant. The first difficulty mentioned would alone be sufficient to quiet all fears upon this subject. The only danger to be apprehended is from electrotype copies, the process of procuring which was described in my last report; but if the original engraved plate is well guarded no evil can arise from this source.—*Ellsworth's Report*, 1845, *pages* 515, 516.

PRINTERS' INK.

An important improvement has been patented for printers' ink, which consists chiefly in mixing coalaphane, one of the products of the destructive distillation of coal, with the materials known as resins, gum resins, or bitumens, and with lampblack, or black in suitable proportions. The advantages claimed are cheapness, durability, and difficulty of erasion. The ink is freed from empyreumatic odor, and, from the specimens of printing presented, must answer well.—*Burke's Report*, 1846, *page* 36.

STEREOTYPING.

Stereotyping has, during the last fifteen years, made scarcely any advance upon its original condition; but, during the past year, a very important improvement has been made in casting and finishing the type blocks, by which a very large number of plates may be cast at once—and that, too, without marring a single block. One principal feature consists in placing the moulds vertically, instead of the old made of placing them in a horizontal position; and there are other important improvements in finishing the blocks, by planing and chiseling machines—an operation heretofore performed by the use of hand tools. But the most striking improvement in this art is the one made in Germany, and just announced in the public prints—of making the stereotype blocks of iron, instead of the usual type metal. If stereotype plates can be made of cast iron, as stated, we must hail the invention as one of the most valuable of the age, as it will reduce the price of books to a very little above the cost of the material. It has been stated that, by means of the improvement, the whole Bible has been printed for about twenty-five cents. No official authentication can be given of the above; but we are not much surprised at the announcement, knowing the wonderful perfection of Prussian and German iron-casting.—*Ellsworth's Report*, 1845, *page* 517.

PRINTING PRESSES.

Two signal improvements in printing presses have been patented during the year—in one of which there are six pressing cylinders revolving about an axis, the cylinders being furnished with an ingenious arrangement of fingers, which seize the sheets of paper, carry them round and over the bed, perform the pressure, and deliver the sheets in a rapid and beautiful manner. The press requires four attendants, and delivers the sheets as fast as they can be fed in by the four. The other press is for printing the sheets on both sides, which it does be-

fore they are delivered, by an admirable and very compact arrangement of the machinery. Perfect operating models of both the last-named inventions were deposited in the office, affording ocular proof of their success.—*Ib.*

MUSICAL INSTRUMENTS.

PIANO FORTES.

A patent was granted in 1844 for the Æolian piano, which is a combination of the instrument well known as the accordion, with the piano forte. Attempts were made many years ago to effect this combination, but without success. The inventor has so arranged the operating parts of the two instruments, that the piano-forte movement is not at all interfered with in operating the accordion. The action of the piano and accordion are made simultaneous, at the will of the performer, by a very simple contrivance. The instruments are well adapted for situations where injuries, very likely to happen to the accordion, are easily repaired; and where the proprietor or performer is enabled to tune the piano by the accordion—the pitch of which is not so apt to change under the influences of moisture, changes of temperature, and frequent use, as the strings of the piano. The piano has for several years past been very much improved, particularly in the touch or movement, and by the introduction of cast metal frames to sustain the strings; giving greater stability of pitch and improved tones. The piano may, perhaps, take rank next to the violin, as a musical instrument affording opportunity for the exercise of taste and skill; but genius is not satisfied with the piano as it is, and is bent upon increasing its capabilities to suit the diversities of taste, and place it at the head of the list as an instrument of versatile powers. Within a few days a patent has been granted for a mode of producing the harmonic tones upon the piano, by connecting with the pedal an apparatus which shall make a slight pressure upon the middle of the string; thus giving the harmonic octave. The pressure is made to imitate, as nearly as possible, that of the finger in producing these exquisite tones upon other stringed instruments. Pressure upon other nodes of the strings would of course produce harmonic tones; but the inventor is satisfied with the harmonic octaves. A patent has been granted for the combination of the glassichord with the piano; and in the same connexion an improvement has been made in the tones of the glassichord itself, by a more elastic mode of suspending the strips of glass than has been before used—*Ellsworth's Report*, 1845, *pages* 513, 514.

A patent has been granted for attaching a swell to the piano, for the purpose of giving the crescendo and diminuendo tones, and also, in the language of the inventor, to furnish the explosive tones. The sounding part of the instrument is enclosed in a tight case, provided with shutters, which, by the action of a pedal, are opened gradually to produce the swell, and suddenly to produce the explosive tones.

In the early part of the year a patent was granted for a mode of producing harmonic tones upon the piano by connecting with a pedal an apparatus which made slight pressure upon the middle of the strings, in imitation of the delicate touch of the finger which produces these exquisite tones upon the violin and other stringed instruments, thus producing the harmonic octaves. Pressure upon other nodal points of the strings would of course produce other harmonic tones.

A patent has also been granted for a mode of striking the octaves upon the piano without the necessity of stretching the fingers after the usual mode. The improvement is to produce, by striking upon a key, the effect that usually results from striking it and the eighth, or any particular key beyond it, in order that those persons who find it difficult to reach an octave upon the series of keys may easily produce the same result by striking one single key. The inventors give the following description:

"Our invention is not intended to be limited to the striking of octaves, as it will be evident that a piano forte can be readily arranged so that the effect of any two keys of the series may be similarly produced. In order to illustrate the nature of our invention, we will suppose that the first key hammer of the bass operates upon one, two, or more strings, *a a*, in the usual manner. We will further suppose that the strings *b b* are those belonging to the other extremity of the octave, or that they are sounded by means of the hammer of the eighth key on the right of that first mentioned. In order to accomplish this, it is well known the little finger of one hand must be pressed on one key, and the thumb on the other, the operation requiring a considerable and often very inconvenient stretching of the hand; being, besides, attended with other difficulties and dangers, well known to pianists.

"In order to effect the two sounds by means of one key, we arrange by the side of the wire, or string *a*, and at a little distance from it another, or supplementary string or wire, which is carried out and sustained over a supplementary bridge, arranged and constructed in such manner as to permit the passage and vibration of the string over it without *contact therewith*, the said bridge having suitable contrivances applied to it for the purpose of sustaining the *supplementary string* at the same level with the strings *a a*.

"This supplementary string *is of the same length, or is tuned so as to emit the same sound*, or as near the same as may be desired, as that of the *strings b b*, or at the other extremity of the octave. The hammer is made wide enough to strike at the same time upon the strings *a a* and the supplementary string, so that when its key is struck, a double sound, corresponding with those of the two extremes of the octave, is produced."

"Having thus set forth our invention, we shall claim one or more supplementary strings, damper, and bridge, (or other analogous contrivance for supporting the strings and checking their vibration as above set forth,) in combination with the string *a*, or strings *a a*, of a note, and struck by the same hammer substantially in the manner above specified. We also claim the making the pad of the hammer-head of different degrees of elasticity, or harder in that part of it strictly beneath, and which rests upon the supplementary string, than it is in the part or parts beneath, and which strike the other strings, *a a*, the same being for the purpose above explained."

Another improvement of a distinct character, but to attain the same end, has been patented; and although it renders the work of the piano somewhat complicated, yet it must afford much facility in many passages. Any number of keys or hammers are connected together by coupling levers; so that the striking of any one key shall, by means of the coupling lever, strike the note of its octave, and the coupling is so arranged that the parts striking the octaves are thrown out of action at pleasure. The inventor does not intend to limit the application of his invention to the production of octaves, but to adapt it to any other series of notes, as taste may require.—*Burke's Report*, 1846, *pages* 36, 37, 38.

PHILOSOPHICAL INSTRUMENTS.

CLOCKS.

A patent was granted in 1845 for *an improvement in the propelling power of clocks*, by which a regular first mover and maintaining power is obtained, without the use of a weight or coiled spring and fusee; which improvement is described as follows:

"I make use of a spring; single or with leaves, fastened by its centre to the bottom of the clock case, or in any convenient place. This spring constitutes the first mover and maintaining power. Now, if the cord or chain that is usually wound on the barrel be attached directly to the extremity of

this spring, it would draw the said cord or chain with more force, and unwind a greater quantity of it from the barrel at one time than another, so that the movement of the clock would never be regular.

"To correct this irregularity of the spring, I have contrived to have the end of the spring applied to a current lever of the second order, to which the cord or chain is connected, which lever is continually increasing in length and power in the same ratio that the force of the spring decreases, or becomes weaker as it extends itself; thus maintaining the action of the spring regularly and equally, which is the great desideratum in the construction of clocks with plain springs, instead of the heretofore used cumbersome and heavy weights."

Balance Wheel.—A patent was also granted for an improvement in the balance wheel of clocks, consisting in the "employment of a suspension piece which sustains the lower sides of the arbor, on which the balance wheel is placed in such manner as to take off the weight of the balance wheel and its arbor from the pivots thereof.

Chronometer Balance.—An improvement in the chronometer balance has been the subject of a patant. The balance is made as usual of two laminæ of different metals, mounted on the staff by the cross arms in the mode usually adopted; but the rim of the balance is made with the arm so placed relatively with the divisions in the rim, that the spaces between the centres of the arm, from the junction of the rim to the extremities formed by each division in the rim, is as near as possible an arc, forming a quarter of a circle, instead of being, as heretofore made, nearly or quite an entire half circle.—*Burke's Report*, 1846, *pages* 38, 39.

SURGERY.

DENTAL INSTRUMENTS.

A patent has been granted for a substantial improvement in dental instruments, in which the advantages of the old turnkey have been combined with those of the forceps. In the turnkey, as before constructed, the hook was to be fixed under the tooth by the insertion of the finger, or by some mechanical contrivance of an unmanageable nature. In this instrument the forceps' handles are so combined with the hook of the turnkey, as that the opening and closing of the handles controls the movements of the hook, and fixes it at the pleasure of the operator, saving the necessity of introducing the finger in the mouth.—*Burke's Report*, 1846, *page* 31.

NIPPLES.

An artificial nipple was the subject of letters patent in 1845. Its construction is novel, and has evidently been the result of close observation upon the philosophy of nursing. Most of the instruments hitherto used for this purpose have failed, not only from the unfitness of the material used, but from the want of proper attention to their construction. The description of the inventor is as follows: "The artificial nipple, in figure and dimensions, resembles other devices of the kind, being made conical, with the wide end open, the edge being shaped so as to press upon without injuring the breast. The small end is closed, with the exception of a minute perforation in the centre. The material around the perforation projects so as to form a tube of about one-eighth of an inch in length, over which is attached, by ligatures of silver wire, a tube of India rubber, about half an inch in length. This last tube is constructed of a flat piece of India rubber, cut square at one end and conical at the other. It is then perforated through its thickness in the direction of its length, so as to leave a slit on its upper end, and the lower end having an opening large enough to fit upon the projecting part of the nipple."

Another improvement has also been made in the material of this instrument, the nipple being made of the elastic portion of bone, the earthy parts having been removed by chemical process.—*Burke's Report*, 1846, *page* 31.

ARCHITECTURE.

METAL ROOFS.

For several years back much attention has been directed to the construction of metal roofs, or metal coverings for wooden roofs; and during the past year two patents have been granted here for improvements in the mode of applying metal coverings, and one in England for making metal roofs. The first of these consists in attaching to the top surface of the rafters, from the eaves to the tip of the roof, a strip of sheet metal with the two edges turned up, and embraced by cleats nailed to the sides of the rafters, so that these strips form gutters from the tip to the eaves of the roof. The edges of the sheets of metal, which constitute the covering of the roof, are secured by being lapped over the turned up edges of the strips; and then the two are bent or lapped over, the one embracing the other, which effectually prevents all leakage. The second consists in securing to the wooden sheathing triangular slats of wood, in pairs parallel to each other, and extending from the eaves to the tip of the roof; the space between each pair being equal to the width of a sheet of metal, and the two slats forming a pair being so far apart as to admit three or four thicknesses of metal. One or two strips of metal are secured to the wooden sheathing between the two slats of a pair, the sheet of metal on each side is bent over, the turn edge being inserted between the slat and the strip of metal, the upper edge of which is then bent or lapped over the sheet. In this way, each pair of slats, and strip or strips of metal, between and lapped over the sheets, forms a ridge from the eaves to the tip of the roof. And the mode of making iron roofs consists simply in having the iron rafters extending from the eaves to the tip of the roof grooved, to receive the edges of the sheets of metal, which are bent and properly secured therein.—*Ellsworth's Report*, 1845, *page* 500.

FIREPLACES.

A patent has been granted for a peculiar construction of fireplace in which the inventor proposes to obviate the smoking, by so constructing the chimney in building the house, that a current of air brought from out of doors descends in a sheet the entire length of the arch of the fireplace, and comes down obliquely forward in front of the fire. A patent has also been granted for a mode of curing smoky chimneys; the substance of which consists in dropping the back of the fireplace about six inches below the arch, and enlarging the throat above the arch. The inventor contends that neither of these features alone would cure the defect, but their combination is essential to the result.——*Ib.*, *page* 514.

CHEMISTRY.

SILVERING LOOKING-GLASSES.

A patent was granted in 1844 for silvering looking-glasses. This invention consists in the substitution of a coating of silver for quicksilver in the preparation of glass mirrors. It has been for some time known that aldehyde (which, in chemistry, means alcohol minus hydrogen) possessed the property of precipitating silver from its oxides in metallic form by the aid of heat; and that a glass tube—such, for instance, as a test tube—might be coated with silver on its inner surface, by heating in it over a spirit lamp certain salts of silver in conjunction with aldehyde. Such a process would of course be inapplicable to mirrors; but the patentee has invented means of effecting the perfect reduction of the silver by aldehyde, without the aid of heat. The most important result of this discovery will be found in its bearing upon the health of those concerned in the manufacture of looking-glasses.

By the usual process of amalgamation, such quantities of mercury are used as to render the occupation extremely unhealthy—an evil entirely remedied by the new process. The coating is even said to surpass in reflecting power that usually employed, although this seems rather improbable. No specimens have yet been received at this office, although they have been represented as of great beauty.

In the old process for silvering, or rather coating mirrors, an amalgam of tin and mercury is laid upon the surface of clear plate glass; and this amalgam, when freed from the mercury by pressure, constitutes the reflecting surface. The extensive use of mercury in this operation renders it extremely unhealthy; and the coating thus formed is liable to be defaced by chemical changes, as is frequently witnessed in the spots occurring upon the backs of mirrors. It is contended that the new invention obviates these difficulties. The process for coating the glass with silver is substantially as follows: The glass is carefully cleaned, laid upon a table, and a rim of wax, or some suitable substance, raised around its borders. A solution of silver is then poured upon the glass, a little ammonia added, and, from time to time, a little oil of cassia and alcohol; after which oil of cloves is added, when precipitation commences, and a pure and firm coating of silver is formed upon the glass, which is afterwards carefully dried and protected from injury.—*Ellsworth's Report*, 1845, *pp.* 510, 511.

SALT MAKING.

Two patents have been granted for improvements in this process; in both of which the brine is heated at the surface, instead of the usual mode of applying heat at the bottom of the kettle. It is a well-known feature in crystallization, that rest or quiet among the particles of a solution insures the formation of large and pure crystals. The agitation consequent upon heating a liquid at its lowest portion interferes with the regular formation of crystals, and the salt is deposited in crude and irregular masses. In one of the two last-mentioned patents, the heat is applied over the surface of the brine by means of tubes conveying steam; in the other, ingenious contrivances are resorted to for lowering or raising these tubes, according to the height of the surface of the liquid. Evaporation must of course proceed very slowly in these operations; but if purity of the salt is desired, it is thus attained.—*Ellsworth's Report*, 1845, *page* 512.

Salt making.—An important improvement has been received by patent in the manufacture of salt, and judging from the specimen furnished, and its low price, the inventor or discoverer will not be long in reaping his reward. The claim of the inventor will convey the whole idea in an intelligible manner:

"What I claim as my invention, discovery, art, or improvement, and desire to secure by letters patent, is the art or process of separating the impurities contained in salt water or brine, in its crude state, by adding a sufficient quantity of common salt to the salt water taken from the salt springs, wells, or other source, in its crude state, when properly mixed and dissolved, to bring the brine in the vats or cisterns to immediate saturation, for the express purpose of precipitating the impurities and depositing them in the bottom of the vats or cisterns, without the aid of evaporation or of solar or of artificial heat. I do not claim adding salt to salt water for the purpose of concentration, as is frequently done. But I do claim the process above described of separating the impurities from salt water by the addition of salt thereto, allowing the impurities sufficient time to settle, and the drawing off for evaporation."—*Burke's Report*, 1846, *page* 41.

SUGAR MAKING.

Very important improvements have been introduced in sugar making, and some inventions patented during the year 1843 have been put to the test during the past year. And if reports which have come casually to this office are true, they must be of great value to the inventors, and of the highest importance to the Southern portions of our country. The improvements are three fold—being in the economy of fuel, evaporating the sirups, and granulation of the sugar. Important improvements have also been made in the modes of filtration. In one of these, the sirup, or, indeed, any liquid to be filtered, is run into the centre of a cylinder filled with pulverized charcoal, or other filtering material; the cylinder being kept in rapid revolution, the liquor is forced through perforations on its outer surface by centrifugal action. The experiments with the corn-stalk sugar have been prosecuted with promising success, and it is likely to become a profitable occupation.—*Ellsworth's Report*, 1845, *pp.* 512, 513.

Sugar making.—Some valuable improvements have been secured in this extensive business tending to economize fuel in the process of evaporation. In one of them, the evaporating pans, instead of being heated by steam at a distance from the generator, are set directly into the top of the boiler, thus saving much in the construction, and preventing the waste of heat from condensation of the steam. In combination, also, with this device, the boiler is devided into two parts by a partition, in which is placed a controlling valve, by which the temperature can be raised and regulated, as may be required for different stages of the operation.

A patent has been granted to a foreigner, whose name has been favorably known for many years as one of the most successful promoters of the art of sugar making, and is identified with the introduction of one of the most valuable improvements ever made in this connexion, viz: the clarification of sirups and sugars by animal charcoal, and also the restoration of the animal charcoal after it has become *effete*, as it is termed. His present patent is for an improved process of restoring the charcoal, and also for a method of evaporating and condensing by the same apparatus. A series of tubes, conveying steam, are so arranged as to receive the percolating sirup upon their exterior surfaces; and these tubes are connected with the vacuum pans, so that the condensation effected by the evaporation of the sirup is employed to keep up the requisite degree of rarefaction in the vacuum pans.—*Burke's Report*, 1846, *page* 43.

SAL ÆRATUS.

A patent was granted in 1844, for a new process of manufacture of this article, so useful to the housekeeper in the making of bread, sweetening of milk, accelerating the churning of cream, &c., is usually made by forcing an extra quantity of carbonic acid gas into the carbonate of potassa. One of the common modes of doing this, is to suspend the carbonate of potassa in suitable vessels over the fermenting liquor in distilleries and breweries. The process of fermentation fills the vats with an atmosphere of carbonic acid gas, which, combining with the carbonate, gives us the super-carbonate of potassa, or sal æratus. Owing to the abandonment of the business by a large number of distillers, a considerable source of the supply of this article is cut off; and the inventor proposes, as a substitute, to impregnate the salt by means of the carbonic acid from a common anthracite coal fire.—*Ellsworth's Report*, 1845, *page* 512.

LARD AND OILS.

A patent was granted in 1844, for a very valuable improvement in the application of the pressure to the solid tissues containing fat before they have been burned, or rather, overheated in the process of *trging out*, as it is called. The lard and oil produced in this way are purer, sweeter—keep much better in the warm climates, and are *rendered* in larger quantities.

A foreign patent has been granted also for purifying oils, particularly for soap oils, by forcing air through them when in a heated state.

A new oil, which the inventors have denominated the *American oil*, has been patented, and from the specimen afforded it must answer the purpose of lubrication in place of the fatty oils. It is obtained by the dry distillation of resin. Oil of a certain character has been before obtained from the destructive distillation of resin, but the inventors claim that they have discovered a new hydro-carbon, not before known to chemists. This interesting class of compounds is frequently receiving new contributions, and as slight changes in the processes, even of temperature, result in new combinations of hydrogen and carbon, the presumption is in favor of the discovery.—*Burke's Report*, 1846, *page* 42.

FILTERS AND REFRIGERATORS.

An improvement in this useful combination has been patented, in which the filter is so combined with the refrigerator that the water, when drawn off from the refrigerator, shall be supplied from the filter, and consume no more ice than is required to cool the quantity of water needed for use. The parts are so arranged that the filtering is upwards, and the direction of the water through the filter may be reversed at pleasure, and thus thoroughly cleanse the filtering materials.

A new plan for a refrigerator has been patented, and differs from most refrigerators for keeping meat, &c., in two particulars, viz: the air in the cold apartment is dry, not being in contact with the ice, and the apartment is ventilated by several modes. Usually, in refrigerators, meat and other articles to be preserved become impregnated with mustiness or unpleasant odors, owing to the moisture from the ice and the closeness of the apartment. The ice is placed in an apartment by itself, through which passes a coiled tube communicating with the external air and the apartment in which the provisions are kept. By means of a fan, bellows, or other contrivance for circulating air, the air is driven through the coiled tube, becoming cooled in its passage, and enters the apartment for provisions in a dry state.—*Burke's Report*, 1846, *page* 41.

COLORING MATTER FROM QUERCITRON.

The patentees of this process have, by a slight modification of the process of separating yellow coloring matter from quercitron bark, introduced a substantial improvement. When gelatine is added to a decoction of the bark, the tannin combining with the gelatine leaves the coloring matter precipitated and partly suspended in the liquid. The coloring matter thus separated is impure and deficient in brilliancy. In the improved process the decoction is made and brought to a certain degree of concentration, and allowed to stand for a sufficient time for the coloring matter to subside, when the supernatant liquid is drawn off and the coloring obtained in a clear and bright form. The process has a twofold bearing. The liquid drawn off is used for tanning, and the coloring is fully extracted and of a superior quality.—*Burke's Report*, 1846, *page* 42.

COLORING MATTER FROM SPENT MADDER.

A very considerable saving is effected by an invention for obtaining a good available coloring from spent madder. To three pounds of washed spent madder, five gallons of water are added, impregnated with sulphuric acid, so as to raise its strength one degree by the hydrometer. After standing two minutes, the water is drawn off, and five gallons more of water added, with eight ounces of soda disolved in warm water, for the purpose of neutralizing any remaining acid. In this state it is allowed to stand fifteen minutes. The liquor is then filtered off, and the residue dried in a warm and close room; and when pulverized, it is ready for use as madder is ordinarily used. From the specimens presented to the office, no doubt can be entertained of its value, if the result is certain in all cases, for it makes from that which is ordinarily thrown away an available article.—*Burke's Report*, 1846, *pp.* 42.

ROTTING HEMP.

This subject has suddenly become one of much speculation and contention among inventors, and it appears that some important improvements have been developed in the preparation of hemp and flax, particularly in the rotting process. In the old process of water rotting, the time required varied from five to fourteen days according to circumstances; in the process of dew rotting, from two to six or eight weeks; and in the process called mixed rotting—that is, commencing the rotting in water and completing in the air—from two to three weeks. Under the recent improved processes, the whole process is completed in a day and a half, or two days at farthest. In the old methods the natural temperature of the air or water was relied upon, and of course the process was more or less rapid as the temperature was higher or lower. In the new mode artificial heat is resorted to. The hemp or flax is put into large vats and steeped in warm water, until it is completely macerated; and as soon as it is brought to this macerated condition, the temperature is suddenly raised to the boiling point, which arrests all further rotting. The critical point in hemp rotting is to check the putrefactive process at the proper time, and where it depends upon the fluctuating tempeture of the air, it requires the greatest care and discernment to ascertain when the operation must be checked.

A patent has also been granted for some improvements in the modes of watering, handling, and otherwise managing the hemp.—*Burke's Report*, 1846, *pages* 42, 43.

A NEW DISCOVERY.

An English Chemist named Grove, says the *Courrier des Etas Unis*, has recently made a very curious discovery, the applications of which may be important. It is known that water is composed of oxygen and hydrogen, combined in the proportion of one part of the first and two parts of the second. It is also known that a most intense heat is obtained by burning oxigen with pure hydrogen, and that if chemists have recourse to this powerful means of obtaining light and heat but rarely, the reasons are the labor and cost of the process. Mr. Grove has, however, pointed out a means by which without any other apparatus than a platinum tube, which will not be injured in the experiment, and a small quantity of distilled water, oxygen and hydrogen may be obtained in the proportions in which they enter into the composition of water. The following is the process:

Heat a tube of platinum in a common spirit lamp and pass steam through it, which will thereby be decomposed and transformed into its gaseous elements, which must be conducted into a smaller tube, at the outlet of which it may be ignited. Care must be taken that the orifice of the tube be small, otherwise an explosion may ensue. It is recommended that water absolutely free from salt be used, and from which air has been expelled by a careful ebulition. If instead of a constant current of oxigen and hydrogen, but a small volume of these gasses be needed, Mr. Grove states, that it is only necessary to introduce in a vessel of water, heated to 90 degrees beneath a bell glass, a ball of platinum intensely heated. The water will immediately be decomposed, and the gasses will fill the bell glass. Osmium and Indium seem to have the same effect as platinum, and it is possible that gold too will answer. It is not unlikely that this discovery may be applied to lighthouses, the lighting of buildings, etc., if not of cities. If verified by experience on a large scale it cannot but be important.—*U. S. Gaz.*

FIRE ARMS, AND IMPLEMENTS OF WAR.

But three patents have been granted in this class: two of them for modifications of previously known modes of loading small arms at the breech, by making the rear part

or breech of the barrel separate. In one of them, this separate section turns on a pin parallel with the axis of the bore, and at the side; so that, by turning on this pin, the section can be lifted up, charged, and let down again. And in the other, that end of the movable section which unites with the main portion of the barrel lifts up, as in Hall's rifle; the patent being granted for an arrangement of parts to throw it up and down, and to insure its retention in line with the bore when down.

The third patent is for an alleged improvement in the mode of making large wrought-iron guns, by means of a series of rings or hoops, screwed into each other, to form the inner periphery or bore, over which another series of rings are screwed, breaking joints with the first; and, in this manner, adding a third, fourth, or any other number, to increase the thickness.

Several applications for patents were made, during the past year, for making this class of guns, by means of staves and hoops, or rings, which were rejected for the want of novelty; this mode having been the first adopted when cannons were first made, and finally abandoned as worthless. It is to be regretted that those who have applied their minds and means to make improvements in the construction of large guns of wrought iron have not first acquainted themselves with the properties of iron, and the various changes which it undergoes whilst under the action of the fire and hammer; for there is probably no branch of the arts that requires more experience and judgment, aided by science, than the working of iron, particularly when applied to ordnance; and yet persons wholly unacquainted with the subject undertake to dictate to men of experience and science.—*Ellsworth's Rep.*, 1845, *p.* 506.

But two patents were granted in 1845 for improvements in fire-arms, one of which is for an improvement of the "continual prime," and its application; and the other is for an improvement in the manufacture of wrought iron cannon.

"Continual prime" has long been in use, particularly in Europe. It consists of a small and very flexible tube filled with percussion powder, and flattened. A long strip of this is placed in some convenient cavity in the stock or lock of the gun, from which it is fed to the required point by any convenient device. The end of this prime is so situated that, as the cock descends upon the nipple, it cuts off a small portion of the prime, carries it down upon the nipple, and explodes it. As the percussion powder extends uninterruptedly through the whole of the strip of prime, the whole is sometimes exploded by being cut off, and sometimes by the explosion which takes place between the cock and the nipple. This renders the use of continual prime too unsafe for practical purposes, although it would otherwise be of great value. The improvement above alluded to is intended to obviate these inconveniences, and appears well calculated to attain the object at which it aims. The following extracts from the patent will give as clear an idea of the invention as can be presented without drawings:

"The nature of the first part of my invention consists in so making primers of fulminating mixtures, or such compounds as ignite by percussion, as to have a series of any number of primers in a continuous strip, but each separated from the others, to prevent the communication of fire from the one exploded to the others; by means of which, a magazine of such primers can be carried in connexion with the gun or other fire-arm, and each primer exploded without any danger of communicating the fire to the rest in the series.

"And the second part of my invention consists in connecting with all kinds of fire-arms, such as cannon, guns, pistols, &c., a magazine for containing primers, made in accordance with the first part of my invention, from which the primers may or can be fed forward to the place where they are to be cut off, preparatory to being exploded, or directly to the place of explosion; this magazine being so connected with the hammer or other moving part of the lock as to push forward the primer by the movement of the lock.

"The mode of making the series of primers, under the first part of my invention, which I prefer, is that represented in the accompanying drawings, and is as follows, viz: A strip of paper, either in a moist or dry state, is, by means of appropriate instruments and by the application of pressure, forced out into cup forms, the spaces between the cups being sufficient to prevent the communication of fire from one to the other. These cups are filled with the percussion or fulminating mixture, even with the original surface of the strip; it is then coated with a varnish of gum lac dissolved in alcohol, and covered with a thin strip of paper, and the whole is then varnished over, which renders it imperviable to moisture. It is important that the two strips of paper be made to adhere in the spaces between the several cups containing the fulminating compound, and that none of the mixture be deposited or left on the spaces or divisions. The method which I have pursued in making these primers is, to form the cups in paper by forcing in the mixture, the one operation being sufficient instead of two; and it will be evident that this can be done by placing the strip of paper on a bed, having a countersink of the form intended to be given to the cup, and laying the paper thereon, and the mixture forced into it by a piston working in a hole in a plate placed above the paper to keep it in place, and to hold the mixture and form a guide for the piston."

"What I claim as my invention, and distinguished from all other things before known, is, first making primers of fulminating mixtures or such compounds as ignite by percussion in a continuous series; each primer, or any two, or greater number, being separated from the others by a substance which is more or less combustible than the fulminating mixture, by which one or more may be exploded without communicating fire to the others.

"Secondly, the mode herein described of moving and measuring out the primers by the movement of the lock, substantially as described."—*Burke's Rep.*, 1846, *pp.* 80–1.

The subject of the second patent will be clearly understood from the following extract:

"This improved cannon is formed of a series of rings or short hollow cylinders, of wrought iron or steel, or of wrought iron and steel combined, which rings are joined together by their ends in sufficient number to make the length required for the whole cannon. Each ring or cylinder is formed by winding or turning a piece of iron of the thickness required for the walls of the cannon round a mandril, and welding its ends together by a scarfed joint; or, second, several rings may be formed of thin iron, and of different sizes, so that one shall slip over the outside of another, until a sufficient thickness for the cannon shall be attained, when, by welding these several rings to-

gether, a single ring is obtained; or, thirdly, long bars of iron or steel of a width equal to the length of a ring, the ends being scarfed down, may be wound over a mandril or spindle, in the manner that pieces of riband are wound upon a block. These spirals being welded together, form a complete ring or hollow cylinder; or, fourth, long and narrow bars may be wound upon a mandril, side by side, and upon the top of each other, until sufficient length and thickness be attained for a ring; and these turns being welded together, the ring is formed.

"They are next to be heated and placed end to end, and welded together, and thus a hollow frustum of a cone is formed of a length required for the cannon. The trunnions are to be welded upon the sides of the cannon, either before the full length is made out, or when it is completed, or they are welded upon a separate ring or band larger than the cannon, and secured to the same by a screw, the thread of which is cut upon the outside of the cannon, to fit a corresponding thread cut upon the inside of the ring. The breech pin may be screwed into the cannon after the cannon is bored and turned, or it may be welded in previously to finishing the cannon.

"What I claim as my invention in the foregoing specification is this, viz: I have invented a new and improved kind of cannon, which is formed of a series of rings or short hollow cylinders, joined together by their ends, in sufficient number to form the length required for the cannon; and for this I claim letters patent."

The process of the patentee differs but slightly from some of those previously resorted to, but his practical results may be widely different. The *principal* obstacle which has heretofore been met with in the manufacture of wrought iron guns has not consisted in the difficulty of forming or welding the parts of which the gun has been composed, but in welding these parts to the already partly formed gun—(and this part of the process does not appear to have been particularly improved.) For this purpose it is necessary, at each successive welding, to raise to a welding heat the large mass of iron to which the parts are to be joined. When the guns are comparatively small, they may bear this process without serious injury, and without great danger of imperfections in the welding; but when the gun is very large, the intensity of the heat required, and the readiness with which iron combines with oxygen, carbon, and other impurities to which it is necessarily exposed during the process, are such, that the iron becomes deteriorated, and a perfect weld is rendered a matter of extreme difficulty, if not impossibility.—*Burke's Report,* 1846, *pages* 81, 82.

CIVIL ENGINEERING.

IMPLEMENTS USED IN EXCAVATING EARTHS, ETC.

Several patents were granted in 1844 for instruments for removing sandbars or shoals in rivers, &c.; for excavating and removing earth, for ditching, and other similar purposes. As these several subjects are difficult of explanation without drawings, they will be more fully illustrated in our forthcoming numbers.

HYDRAULIC FOUNDATIONS.

Under this head two patents were granted in 1845, viz: The *screw-pile*, invented and patented some years since in Europe, but which until recently has not been extensively used, the inventor has caused to be patented in this country. Its usefulness for hydraulic foundations and moorings has come to be understood in Europe, and it will probably soon be equally well appreciated in this country.

Letters patent have also been granted for an improvement in hydraulic foundations of an entirely different character. It is well adapted to sandy bottoms, and calculated to obviate the great evils consequent upon the washing away of the sand, and thus undermining the pier upon which the wharf or other superstructure rests. From the following, nearly in the words of the patentee, the invention will be understood:

"To construct a circular foundation.—A platform of temporary piling is first erected upon the site for the convenience of the workmen. An iron pile, (wrought,) of suitable length and diameter, and armed with one of Mitchell's patent screws at its lower extremity, is inserted into the ground or bottom, at a point occupying the exact centre of the intended structure. This forms the guide-pile, to regulate the placing of all the other parts of the structure. A series of similar wrought-iron screw-piles are then inserted into the ground or bottom, at exactly equal distances each from the centre guide-pile, and at exactly equal distances from each other, forming, of course, so many points in a great circle. Between each pair of piles so placed is next inserted a segmental piece of cast iron, termed a bed socket. One of the segments being placed between each pair of piles, and resting its angular edge upon the ground or bottom, forms consecutively a circular, grooved, and socketted surface to receive the parts of the superstructure, as follows: Upon each pile is now fitted a tubular piece of cast iron, with projections at opposite sides. The lower end of this tubular casting fits into the socket of the bed plate, and the projections on its opposite sides form a perpendicular groove, in which are received the edges of the pannels, and which pannels and tubular pieces have a uniform circular surface. The shell of the foundation is then completely formed, and is now strengthened by a series of tension rods hooked on to the several tubular pieces and other parts, if found to be necessary, and all these tension rods are set up to the centre guide-pile by means of swivel screw-joints. The cylindrical cast iron shell thus formed is then to be filled in with stone, concrete, or other filling, as may be found expedient.

"To protect the bed sockets aforesaid from being undermined and disturbed from their proper level, by the action of tidal currents, I adopted the following plan: As soon as the circle of iron piles is completed, I put down outside thereof a complete circle of pieces of cast iron, say six feet in length and diameter, of a converse segmental form; and these segments are all shackled together by bolts passing freely through hinge bosses cast on their inside angles. Two or more of these concentric circles of these segments are thus put down, either by means of a diving bell or other hydro-pneumatic apparatus, and it is apparent these segments, when undermined by the action of the current, will descend, generally, and thereby enclose and protect the surface which they respectively cover. It is assumed, also, that these segments will so deflect the tidal current from the main body of the work, about its base, that no process of undermining can take place; though, as an additional security, the spandrels between the converse

surfaces of these segments should be filled in with clay or stone as soon as the bed plates are fixed in position. In another form of these segments for protecting the bottom from abrasion, it is proposed to cast it as a hollow box, whose transverse section should be triangular, with hinge bosses for shackling the pairs together. This form would more effectually exclude the water from acting upon the surface enclosed by these segments.

"The application of this mode of forming the shells of piers, breakwaters, &c., where the plan is rectilinear instead of circular, must be obvious without details."—*Burke's Report*, 1846, *pages* 67, 68.

DREDGING MACHINES.

Two patents have been granted within the year for machines of this class, intended for the deepening of channels, &c., and two for excavating and ditching. One of these patents is for an improvement upon those dredging machines which effect their excavations by a scoop, having a long handle by which it is thrust down, and is afterwards filled and elevated by a proper arrangement of blocks and rigging, by operating which the proper motions are given to the scoop. The mast with which the rigging is connected has heretofore been stationary; but the patentee, believing that the operation would be facilitated thereby, has arranged and properly supported the mast upon circular rails, by which it is made movable, and the operations of the machine extended.

The other dredging apparatus is intended to operate upon a large scale, and will be understood by the perusal of the following claim which was granted to the patentee:

"What I claim as my invention, and which I desire to secure by letters patent, is the before-described mode of scraping the bottoms of rivers by operating a floating scoop by power machinery, placed in a separate vessel anchored on the opposite side of the river, and floating scoop being attached to an anchor up stream, so that the current will carry back the scoop to the opposite side of the river at the termination of every operation of the said scoop for a repetition of the scoop; the vessel containing the engine being moved up or down stream, as the work progresses, by the power of the engine, as described."

One of the ditching machines patented consists of a series of cutters, such as have heretofore been used for cutting and forming the sides of the ditch, in combination with a scraper which follows them for cutting the bottom and conveying the excavated earth to the side of the ditch, and firmly depositing it there. The edge of the scraper is in a common form, but the body of it is warped or twisted in such a manner that, as the excavated earth passes along over its surface, it is so turned as to fall and be pressed upon the bank with the turf side next to and extending up from the side of the ditch. In the western prairies, where wood for fencing is difficult of access, these ditches and levees are valuable substitutes, and machines for constructing them with rapidity and economy are of very great importance.

A mode of raising sunken vessels or recovering their cargo has been patented within the year, which is said to have proved very successful. Circumstances are often such that it could undoubtedly be very advantageously employed. The description of the apparatus and mode of operating are as follows, nearly in the words of the inventor:

"The nature of my invention consists in the employment of a cloth or flexible caisson to surround the wreck for the purpose of excluding the surrounding waters, so that the water within the vessel and caisson can be pumped out, and in the employment of a frame or frames to be erected above the vessel for the purpose of giving access to any part of the vessel; and also in connecting with such cloth or flexible caisson a pump or pumps, suspended to a steamboat or other vessel carrying the motive force for pumping water from the caisson and wreck.

"The flexible caisson is made of canvass or other cloth, of sufficient size to surround and encompass, and extend sufficiently low to cover, all the leaks in the wreck. It should be made water-proof by any of the known means, and of sufficient strength, by repeated layers, to resist the pressure of water. The lower edge is lapped over, or hemmed, to embrace a chain which extends entirely around, to act as a sinker, and enable the pressure of the surrounding water to force the cloth or caisson up to and under the bottom of the wreck.

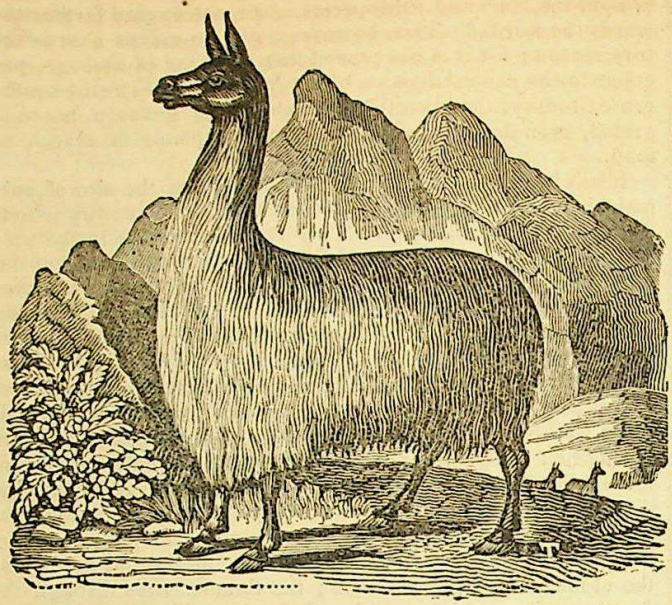
"For the purpose of getting access to the cargo of a wrecked vessel, I employ in combination with the flexible caisson a frame, which I denominate a platform, the construction of which should be varied to suit the peculiar situation and condition of the wrecked vessel. I shall here set forth the mode most generally applicable. In the first place, I make a frame about twelve feet in length, and as wide as the wrecked vessel, enlarging the same if it becomes necessary in the operation of saving the wreck or cargo. The said frame consists of two bents placed twelve feet apart, and secured together by four girts, two at each end. When the frame is thus constructed, I attach it to the vessel by means of bolts, screws, chains, or other fastening, so as to render it a firm fixture to the wrecked vessel. The frame is then made to receive timbers and floorings, putting it in readiness for operations on the wreck.

"When the wreck is wholly under water, I build a temporary frame around the sides of the wreck, extending from the deck or uppermost part of the wreck above the surface of the water. When the wreck is only partially covered with water, the temporary frame may only extend around that part of the wreck which is submerged; and in case the upper part of the wreck is out of the water, but a part of it is stove in or broken, or is otherwise rendered so leaky as to interfere materially with the water being pumped out, I make the frame-work of such extent and in such places as may be required by the particular circumstances.

"The flexible caisson encircles this platform or frame as well as the vessel, and by this means access can be had to any part of the inside of the vessel for the purpose of removing any portion of the cargo, or closing up the leaks, if the intention be to raise the wreck."—*Burke's Report*, 1846, *pages* 69, 70.

A gentleman in Worcester, Massachusetts, claims to have invented a machine for lifting heavy articles from the bottom of deep water. A large vessel containing materials for generating gas is laid down to the bottom, filled with water. The weight is attached, and the combustibles ignited for the creation of the gas, which expels the water and raises the vessel to the surface with a force of over sixty pounds to the cubic foot. The machine is said to be simple, cheap, and likely to be very useful.

AGRICULTURAL.



From the Foreign Cultivator.

THE ALPACA.

HISTORY AND PROPERTIES OF THE ALPACA.

At the time when Pizarro and his twelve hardy followers first reached the Peruvian shore, (1525,) among other objects of interest and curiosity they found the natives in possession of two domestic animals, each peculiar in its kind, and differing from any which they had previously seen in the newly discovered regions of the West. To the Europeans these animals appeared to be an intermediate species between the camel and the sheep, but partaking more of the properties of the latter; in consequence of which, filled with the ideas of fatherland, they called them *carneros de la tierra*, or country sheep, the designation by which the llama and alpaca were afterwards known to the Spaniards. Having completed his discovery, Pizarro returned home, provided with reports on his success, and descriptions of the varied productions noticed by him in the new region, which he offered to add to the dominion of Castile; and, as tradition states, among his packages were specimens of alpaca wool, together with textures made from it by the natives.* His arrival excited the liveliest sensation among his countrymen; and so much was Charles V. delighted with the prospect of so valuable an acquisition as the one described to him, that he conferred the supreme command of the force solicited upon the discoverer, through whose instrumentality he hoped to see the conquest achieved, at the same time loading him with honors.

Seville was then the court of the Castilian monarchs, as well as the emporium of that commerce which the discovery of the New World had created. It was not only the chief city in Spain, but also the metropolis of an empire comprising the most flourishing countries in Europe. There the most distinguished individuals from Italy, Germany, and the Low Countries, met in union with their Spanish fellow-subjects before the throne of their general master, vying with each other in their ardor to execute his commands. The cleverest Spaniards in every branch of science were congregated on the banks of the Guadalquivir; in every department of war and politics no government was better served than that of Spain; and it is only by taking these circumstances into consideration, that we can duly appreciate the talents, and estimate the character, of those individuals selected to accompany or follow Pizarro, for the purpose of preaching the gospel and organizing a government in Peru, and to whom we are indebted for the first accounts of that interesting race of quadrupeds to which the alpaca belongs.

Robertson, in his "America," avows the high estimation in which he held these early annalists, and enumerates the merits of such of them as he had occasion to quote; nor should it be forgotten that the author of the best epic poem in the Spanish language, bore a distinguished part in the conquest of both Peru and Chili. As eyewitnesses, these functionaries described the properties and habits of the Andes sheep in a plain and practical manner; and as the present essay is intended rather to show the benefits which, as agriculturists and manufacturers, we may derive from the adoption of the wool-bearing species, than to attempt any scientific arrangement or zoological classification, it may be necessary for the writer occasionally to avail himself of their testimony, in confirmation of such facts as he may seek to establish.

On no two points do the early writers on Peru agree so perfectly as in reference to the number of the species into which the Andes sheep were divided, and the purposes to which the natives applied them. They state that there were four kinds, two tame and two wild; and this point is now too well ascertained to admit of a doubt. When the Spaniards reached the central declivities of the Cordillera mountains, they found them inhabitted by various tribes of Indians, governed by Incas, or Emperors. The dominion of these princes was endeared to their subjects by the wisdom and benevolence which they displayed in the exercise of regal power, and more especially by their patronage of agriculture and the useful arts. In economical husbandry, and such other pursuits as conduce to the sustenance and comforts of man, as well as in the smelting of ores, and working of gold and silver, the Peruvians had, in fact, attained a degree of proficiency which astonished their invaders.

They were, however, chiefly devoted to a pastoral life, supplying the wants of their families from the produce of their sheep. Of these the Incas had large and numerous flocks as part of the regal establishment, the llamas of which were employed as beasts of burden; while the wool of the alpaca was distributed among the poorer classes living under the cold climate of the mountains, where the cotton plant does not grow. These flocks were divided according to their color, and left to range on distinct grounds; great care being taken to class the young ones as soon as they were in a situation to leave their dams. By this means, as far as possible, the flocks retained one uniform color, each of which had its corresponding name, the white and black being most esteemed.

The growth of wool, it thus appears, was under the immediate patronage of the Incas, and it is only reasonable to suppose that they employed every possible expedient to improve the breeds of their sheep. Under the patriarchal government of the Incas, the poorer classes were chiefly dependent upon them for raiment and food; and they had, besides, to support and clothe armies of fighting men, laborers, and a host of menials. It was also part of their duty to provide against the contingencies of famine, by establishing suitable magazines of provisions. Of the number of the flocks kept by the Peruvians in ancient times, some idea may be formed, when it is taken

* Zarate says, that after Pizarro had been deserted by the greater part of his companions, who returned to Panama, he was left on a small and uninhabited island, where his people were obliged to subsist on shell-fish and snakes. Exploring the Peruvian coast in their fragile bark, the persevering adventurers landed upon a convenient spot, where they procured from the natives several country sheep and other supplies. This was the first time these animals were seen, and their flesh eaten, by Europeans.

into account that, after the enormous desolation caused by conquest had ceased, the aboriginal inhabitants were still estimated at from seven to eight millions; whereas they do not now amount to so many hundred thousands.

The comparatively small size of Peruvian sheep, as well as of the vegetable forms by which they are surrounded, clearly indicates that the climate of the Andes is not favorable either to animal or vegetable growth. It has also been remarked, that there the human species is subject to the same rule: man decreasing in bulk and stature in proportion as he dwells near the mountain summits. In Peru the winter sets in towards June, and is severely felt on the highlands, where the snow remains upon the ground six, and in some places eight months in the year.

As soon as the narrow and green strip of land bordering upon the Pacific is passed, the traveller begins to ascend the slopes; and when he attains the first table-land, observes a complete change in the climate and the appearanee of vegetation. Except in the *yungas*, or hollows, where an alluvial soil has been collected, and where the Indian plants his sugar-cane, *banana*, and esculent roots, the country wears a naked and barren aspect.

Here, at an elevation of from 8,000 to 12,000 feet above the level of the sea, the Peruvian tends his alpacas and llamas, allowing them to range at the foot of the snowy cliffs called *punas*, or to wander on the *paramos*, or heaths, where they derive subsistence from the moss and lichens growing on the rocks, or crop the strong grasses and tender shrubs which spring up upon the flats, favored by moisture. On these commons the animals may be said to shift for themselves, exposed to all the rigor of the elements, and receiving no food from the hand of man. The shepherd only visits them occasionally; yet such are their gregarious habits, that the members of one flock seldom stray away and mix with another, being kept in a good state of discipline by the old ones, who know their own grounds, and become attached to the place of their nativity, to which they return at night, evincing an astonishing vigilance and sagacity in keeping the young ones together, and free from harm. Hence there is no need of their being marked; and so great is the intelligence of some *punteras*, or leaders of a flock, that a more than ordinary value is, on this account, attached to them by the owner, part of whose duties they perform.

The point nearest to the equator at which Andes sheep were originally noticed, is Rio-bamba, situated in latitude 1° 38′ S., about ninety miles S. W. of Quito, and not far from the snow-capped mountain of Chimborazo. The town stands 11,670 feet above the level of the sea, to which elevation the temperature of the air corresponds. In this tropical region, and consequently on a spot where excessive heats might be expected during the month of August, the two Ulloas remarked, that towards evening the thermometer regularly fell two or three degrees below the freezing point, and next morning rose eight or twelve above it, which would indicate, that, at a certain elevation, no land is exempt from the dominion of frost. On the contiguous mountain of Pichincha, where the Spanish commissioners performed part of their astronomical labors, they found the cold so intense, that in the little hut which served them for shelter, crowded as it was with inmates, and lamps constantly kept lighted, sometimes each person was obliged to have a chafing-dish, constantly supplied with burning charcoal, near him. The feet of the Europeans were nevertheless swoln, their hands covered with chilblains, and their lips so tumid and so much chapped, that the mere effort to speak often caused the blood to gush.

Although, from the point above mentioned, across the equator, the climate becomes milder, and vegetation more abundant, it has been remarked that the wild species do not pass the line, but continue stationary there—a phenomenon for which some Peruvian writers have endeavored to account, by alleging that the *ichu* plant, a coarse grass, and the favorite food of both the tame and wild species, does not extend further towards the north.* This, however, is by no means a satisfactory reason; for it is not proved that this kind of herbage, peculiar to the central division of the Andes, reaches to the southern extremity, the direction in which the guanaco has migrated, even descending to the remotest plains in search of food.

It has been remarked by physiologists, that the size of animals is usually adapted to the nature of the country which they were born to inhabit. This is not the case in the present instance; and whether we consider the great extent of the Andes mountains, their stupendous forms, the immense elevation of their summits, or the severity of the climate prevailing upon them, the more shall we be astonished at the diminutive size and delicate frame of the quadrupeds dwelling in those secluded recesses. The woolly natives, nevertheless, possess a hardiness of constitution, and a peculiarity of structure, admirably well adapted to the nature of their birthplace. There, during half the year, snow and hail fall incessantly, whilst in the higher regions, as before noticed, nearly every night the thermometer falls below the freezing point, and the peaks consequently are constantly covered with an accumulation of ice. The wet season succeeds, when flashes of lightning traverse the clouds in rapid succession; the thunder rolls through the firmament in grumbling and prolonged peals, followed not by showers, but by torrents of rain, which, after collecting, fall headlong from the rocks, or pour into the crags and chasms, leaving the slopes bare of soil, and spreading desolation wherever they pass, till at length the stream is lost in some lake, or serve to swell the head waters of some river.

It is astonishing that the temperature of the air on mountains so peculiarly situated, and exposed to the full blaze of a vertical sun, should be so much chilled as almost to present the desolate aspect of the Arctic regions; and yet such are the tracts of land upon which the Andes sheep abound and thrive; the flocks, more especially those of alpacas, being still, comparatively speaking, considerable in the vicinity of Rio-bamba, where the inhabitants evince a great aptitude for woollen manufactures, and carry on a trade in the raw material. Of alpaca and vicuna wools the women knit stockings, colored cloaks, and also gloves equally ornamented.† *Ponchos*, or men's surtouts, are wove in colors, and of so delicate a texture as to be worth $700 dollars each. They are also used throughout Peru as a riding dress by the wealthest ladies.

Along the extended range above named the tame breeds were left to browse. The sheltered part of a hill, the bottom of a dale, or the furzy heath, were their favorite haunts. There they picked up their scanty and scattered food, under the lower boundary of the snow, ascending as it disappeared from the surface. Sometimes they fed on the mosses which fringe the rocks, and plants growing on the hillocks, or would descend the slopes and enter the *ichuales;* while in the higher and more secluded regions, reaching nearly to the summits of the lofty chain, as well as on both sides of the double line which it assumes in Peru, dwelt the vicuna and guanaco in a

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* *Ichu* (*Jarava*—class. *Monandria Dyginia—Planta cæpiloso, bipedalis—foliis involutis subulatis—spicâ paniculata.*) Of the gramineous tribe, grows high, and when at its full size resembles a reed, the stem strong and erect. It is found on the *punas*, or bleak and unfrequented spots of the greatest altitude; and when young serves to feed cattle, and full grown is used as fuel for cooking, in those barren regions, where the dung of the llama and alpaca only can be had. In the Huancavilica mines it was formerly used in the furnaces, to separate the quicksilver from the ore. The Indians also use it for thatching. The llama and alpaca are fond of the green tops; and when feeding in an *ichual*, or *ichu* field, their bodies are hidden, while their heads are seen gracefully towering above their food.

† Such as Verona serge, twilled *ratinette*, Astrakan cloth, &c.

wild state, and far from the abode of man, hunted only for the flesh and skins.

As regards the historical part of the subject, the preceding outline may suffice. On the score of zoology, it may be proper to remark, that Cuvier places the genus *Camelus* at the head of the family of the hornless ruminants, and next in succession the llama, which term he applies as the generic name of that form of *Camelidæ* by which the New World is distinguished; whereas Illiger separates Andes sheep from the latter, ranging them in a distinct order, to which he gives the name of *Auchenia*, in allusion to the length of the neck. Whether this is a property sufficiently distinctive to warrant a separate division, this is not a place to enquire. The elder naturalists agree in their classifications of the llama race.

From the remotest period to which the Peruvian records extend, it appears that the aborigines not only employed the llama and alpaca in their military and domestic service, as the Arabs do the camel, but also used them for food and clothing.

Although it must be acknowledged that the llama and alpaca possess some properties in common with the camel, they are nevertheless separated from him by various and strong marks of distinction. Independent of size and figure, as regards anatomy the absence of the hunch, and in them the callosity on the sternum, constitute striking points of difference. The structure of the foot is dissimilar; their horned hoof, almost resembling the talons of a bird of prey, being very remarkable. In the dental arrangement there is also a variation: in the upper jaw of the Andes sheep there are no incisors; while the teeth, ranged underneath, are differently shaped, sharper, and stand in another position. On each side of the upper jaw they have a canine tooth more than the camel, and generally the osteological character of the head differs. In them the incisors project full half an inch from the muzzle bone, so as to meet the pad fitted above, by which means, and by the aid of the tongue and cleft lip, they are not only enabled to draw together and clip short grass upon the ground, but also, with their long neck, pointed muzzle, and the oblique posture which the head can assume, to reach herbage growing on the ledges and interstices of rocks seven feet high, as well as the tops of hedges and tall shrubs. Their teeth are at the same time so strong, and interlock in such manner, that they easily crush and masticate vegetable substances too hard and tough for ordinary cattle.

In the formation of the stomach there is, however, a great similarity. The endurance of both hunger and thirst, so truly characteristic of Andes sheep, would, indeed, appear surprising, if this peculiarity were not duly considered. In this respect they resemble the camel, which is not only capable of retaining water when once swallowed, but also of producing it, an important part of the animal economy, equally remarkable in his allied species of the New World, which have been noticed to abstain from drink so long as they are provided with succulent herbage. In them the stomach is divided into compartments, some of which are destined to hold food, while others serve as reservoirs for fluids; and one is struck with astonishment at the variety of the component parts of this double receptacle, as well as the complexity of their structure.

The cellular development of that part of the stomach, which in the llama and alpaca is appropriated to the retention of fluids, together with other capabilities of the internal machinery, seem in fact to be more perfect than in the camel. Hence, besides being formed by nature on so economical a scale as to require the scantiest supply of food, and also the smallest possible quantity of drink, when ruminating they have the power of not only forcing the fluid back to the stomach, in order to assist digestion, but also to the mouth, in such a manner as to allay thirst. The apparatus by means of which the process of mastication is performed, appears equally admirable. Naturalists who have had the best opportunities of observation, admit that each variety has a peculiar power to extract and appropriate for its own use, and in the way of nourishment, the constituents of that food which it gathers; and hence the choice ought, as much as possible, to be left to itself. Anything which it eats with repugnance is sure to disagree.

Their patience under the uneasiness arising from the want of drink, exceeds that of the camel. The weary traveller over the Arabian desert is said to smell the well or pond at the distance of half a league; and, in the hope of refreshing his wasted strength he evinces impatience to reach it. In South America the mule perceives water at a still greater distance, and quickens his pace to approach it; but if a llama, or an alpaca, happens to be in company, the animal remains perfectly unmoved, although it cannot be supposed that the olfactory nerves of either are less powerful than those of the camel or mule.

In Peru and Chili, the horned cattle and European sheep, which have multiplied to an enormous extent, while the llama and alpaca have declined, require the occasional mixture of salt with their food, it being ascertained that without it they do not fatten. So fond are they of this luxury, that they frequently roam to a great distance in search of the *salitrales*, or salt-licks, and when satisfied return home. Andes sheep do not evince the same eagerness for salt, and consequently never experience the inconvenience arising from the artificial thirst which it occasions. This abstinence from drink in them may, however, contribute to render their supply of milk scanty; of which, as it barely suffices for their own offspring, the Indian never deprives them.

Nothing better exemplifies the bounty of the Creator to man, than the gift of such serviceable animals as the camel and the llama. Had it not been for the former, the Arabs never could have been able to cross the parched and sandy deserts which intersect their country; nor without the aid of the latter would the Peruvians have been in a situation to ascend the steep and rugged sides of the Andes, with loads disproportioned to their delicate frames.

The Quechuans and Aimaraes, the most numerous and civilized tribes inhabiting the slopes of the central Andes, were essentially shepherds and manufacturers. On the *plateaux*, or level spots open to the western exposure, population was formerly so much concentrated, agriculture so far extended, and the flocks so numerous, that economy became necessary in the distribution of those lands, which are now little else than a trackless wilderness. The chief care of the natives was devoted to their sheep, which formed the standard of their wealth; and not only enabled them to feed and clothe their families, but also to carry their surplus produce to market. A primitive law still exists in Upper Peru, in virtue of which the llama and alpaca, at the valuation of three dollars each, are made a legal tender, and common sheep at four rials. This sensible enactment is derived from the Incas.

The Peruvian mountaineers treated their domestic animals with great kindness, as if sensible of their utility, and grateful for the predilection with which Providence had viewed them. Parsimonious in their habits, their sheep were always turned to the best account; and, on the arrival of the Spaniards, so striking was the contrast between the condition of the two tribes above named, and that of the Araucanos, Puelches, and Patagonians, who were hunters and fishermen, and as such continue to the present day, that it is only reasonable to attribute the higher degree of civilization which they had attained, and the comparative comforts enjoyed by them, to the possession of the llama and alpaca, coupled with the pastoral life which their owners led. With us, the sheep is a connecting link to man as regards support. Half the meat brought to our tables is obtained from that kind of stock, and so is the largest portion of our clothing. In exactly the same manner did the central Peruvians find provision in their flocks.

Frequently the llama, but preferably the alpaca, was a pet in

in the Indian's cabin; and certainly in intelligence both animals are superior to other ruminants. As regards patience and resignation they are equal to the ox; while in point of sensibility they surpass every other quadruped. The size and shape of the eye indicate a strong and quick sight, as well as a peculiar capability of bearing the reverberation of the sun's rays, in like manner as the camel resists the glare of the sands, which in man so often produces ophthalmia. Resembling the best breeds of our sheep, the llama and alpaca are small boned and well proportioned in their quarters; the back is broad and straight; the eye lively and prominent; the countenance open; and one of them, at least, is abundantly supplied with wool.

The organization of both is adapted not only to the nature of the ground which they were destined to tread, but also to the climate under which they were formed to live. The sole of the foot is guarded by a cushion, and the toes armed with hard and curved nails, by which means, and the great mobility of their limbs, they are enabled to climb a steep and craggy hill with agility and security. They may be justly called Alpine animals, and in point of activity will bear some comparison with the *Capridæ*, or goat tribe; while in their flesh, skin, and general appearance, they are not unlike the deer.

How the Peruvians originally became possessed of their domestic breeds, or whether the llama descends from the guanaco, and the alpaca from the vicuna—questions repeatedly started by naturalists in Europe—at this late period could only be a speculative enquiry; and in this respect the traditions of the natives afford no assistance. In their tame as well as in their wild state, the four species herd separately, and when left to themselves do not intermix. Although, from the several points of resemblance between the guanaco and the llama, it is possible to conceive that, by care and cultivation, accompanied by a change of climate and pasture, the former might improve in figure, as well as in the color and quality of its coat, eventually becoming what the llama now is: there does not appear to be any probability that the vicuna was the parent stock of the alpaca. The difference in size and structural formation, the dissimilarity in the wool, and other points of disagreement, present insuperable difficulties; and it is not to be forgotten, that in neither instance has any change in climate or pasture occurred.

Nor can it be argued that a new race has been obtained by means of crossing. The llama and alpaca certainly can be induced to intermix, and of this union there are frequent examples in Peru. From the alliance a beautiful hybrid, in fact, results; if possible, finer to the eye than either parent, and also more easily trained to work; but, like the mule, it does not procreate. Numbers of this intermediate species may be seen in Upper Peru, where they are called *machurgas*, a corruption of *machorra*, a Spanish word meaning a barren sheep.

Acosta affirms, that in the capital of Cusco an Andes sheep was sacrificed every morning, probably at sunrise, as a greeting on the great luminary of day, to whom their adorations were addressed, as being the only universal source of light—the being who creates and sustains all things. During some of their solemn festivals, we are told that the Peruvians immolated as many as one hundred of these animals at a time, an additional proof of the magnitude of their flocks.

WOOL AND MEAT OF THE ALPACA.

Of the two domestic species, obviously the alpaca is the preferable one for our adoption. Whatever may be the classifications of naturalists, the alpaca is essentially a wool-bearing animal; and of the fineness and softness of the textures made from its fleece by the ancient Peruvians, we find ample testimony in the works of several of the early annalists, some of whom acknowledge, that in delicacy of weft they exceeded any cloths at the time manufactured in Spain.

The capability of alpaca wool being converted into articles of fine texture, is now established by the experience of our own artizans, as well as those of France. Fancy goods made from this material, and having a superficial lustre resembling that of silk, for several years past have been selling in the London and Paris shops, and are very generally introduced into Germany and other countries. In quality this wool differs from that of ordinary sheep, exceeding it in length, fineness, and pliability. The staple of English wools is seldom more than six inches long, whereas that of the alpaca averages from eight to twelve, and sometimes reaches twenty, acquiring strength without being accompanied by coarseness, the reverse of which occurs in our woolly tribes. Each filament appears straight, well formed, and free from crispness, and the quality is besides more uniform throughout the fleece. There is also a transparency, a glittering brightness upon the surface, which gives it the glossiness of silk, considerably enhanced when it comes out of the dye-vat. It is distinguished by softness, essential properties in the manufacture of fine stuffs; and being exempt from spiral, curly, and shaggy portions, when not too long it spins easily, and yields an even and true thread. Neither is it liable to *cotting*, which renders wool adhesive, and causes it to form knots, difficult to unravel in the combing process. It is not injured by keeping, nor does it lose in weight.*

Avowedly the climate and pastures of Peru are far from being favorable to the quick growth of wool; and hence, by the natives, the shearing season is not regularly observed. In some places the alpaca is shorn annually, and in others every second year; but frequently the young ones run three summers with the same coat upon their backs. The fleeces range from 10 to 12 lbs. each; whereas those of our full-sized sheep seldom go beyond 8 lbs., and the small breeds 4 lbs. From the larger size of the animal, and the increased surface consequently covered, the alpaca necessarily yields most wool; and it had already been ascertained that on our soil the weight improves. At the Royal English Agricultural Show, held at Liverpool in July, 1844, a sample of black wool was exhibited, taken from an alpaca belonging to the Earl of Derby's flock, the staple of which appeared to be about a foot long; when his lordship's farm agent expressed his conviction that the same animal had then 17 lbs. upon its back.

This is a greater result than was ever obtained in Peru. An improvement of both weight and quality might indeed naturally be expected, it being an undeniable fact that our country is much better suited to the growth of wool than the barren and inhospitable *lomadas*, or slopes of the Peruvian Andes. With us more care would also be taken of the stranger, and in cases of disease he would experience skillful treatment. Greater attention would, at the same time, be paid to the sorting and packing of the wool, which is best when the staple does not exceed from six to eight inches, the process of carding and spinning being more tedious when it goes beyond that length. By regularly shearing the animal every year, we should also obtain wool of one uniform staple; an advantage which we can never expect so long as we are obliged to import it.

As, however, the breeder looks forward to returns, not only on the fleece, but also on the carcass of his sheep, it may be proper to say something respecting the quality of alpaca meat, which, owing to the extravagant prices at which these animals have been bought in England, and their being hitherto considered as objects of curiosity rather than speculation, has not, I believe, been tried, with a view to ascertain its flavor and properties.

The quality of alpaca meat could not, indeed, fail to be good,

* A small bundle of alpaca wool, with a few locks of Australian mixed with it, was accidentally thrown into a closet and forgotten. At the end of twelve months it was opened, when it appeared that the moths had nearly eaten up the Australian, without injuring the alpaca wool.

when the cleanliness of the animal, the nature of its food, and the neat and delicate manner in which it feeds, are considered. Andes sheep eat nothing but the purest vegetable substances, which they cull with the greatest care, and in habitual cleanliness surpass every other quadruped. With their flesh the Peruvians, to this day, prepare a jerked meat called *charque*, which, stewed with rice, or onions and tomatoes, makes an excellent dish. On their farms it in fact holds the place that bacon does on ours, and also serves for a sea voyage. To prepare it the meat is separated from the bones, and cut into long slips, with a due proportion of fat adhering to each, and all the coarse bits rejected. In this state it is slightly salted, dried in the sun, and then smoked; by which process, however, it becomes so hard and dry, that it requires steeping in water for several hours before it is used. Andes sheep eat very much like the venison once cured in North America, and certainly the dried tongues are superior to those of the reindeer.

In Lima, Ulloa assures us that a haunch of llama and alpaca is much esteemed, and, at a particular season, sent down from the highlands, prepared in such a manner as to keep without the aid of salt. For this purpose the meat is exposed forty-eight hours to an intense frost, when it becomes thoroughly congealed. In this state it is preserved sweet for a month or more, if not exposed to a damp atmosphere or the immediate action of the sun; and, when cooked, is found to have lost little of its freshness and flavor. When the alpaca is of a proper age and well fed, the cleft of the haunch is smooth and close, the meat small grained and rather mottled, the fat white and firm, and, from three to four years old, of full flavor. It is not a greasy but rather a juicy meat, and easily digested. The flesh of a full grown one is more nutritious than that of the yearling, although the latter is delicate and savory, and would make an excellent ingredient for a pie.

In point of flavor alpaca meat has, by good judges, been compared to North American venison, and even to our heath-fed mutton. The nature of pasture unquestionably affects both the quality and taste of meat. There is therefore every reason to expect that, fed upon our downs or heaths, the alpaca would yield a good and marketable flesh, thus increasing our supply of one of the necessary commodities of life. In this kind of stock the breeder would find another desideratum, and this is, the largest quantity of flesh on the least possible weight of bone. The quarters weigh from 35 to 45 lbs.

As the skins of Andes sheep may be turned to some account, they ought not to be entirely overlooked. An alpaca skin is not so thick as that of the deer, but strong and pliant; and in an ingenious and manufacturing country like ours, might be appropriated to various useful purposes, among which book-binding is not the least important. The alpaca mantle has ceased to be worn in Peru; but the soft and warm pelt still affords a comfortable bed to the mountain tribes.

To be continued.

Agricultural Emulation.—There is a beautiful circumstance connected with agricultural emulation. In many of the pursuits of life, one man gets rich by making another man poor. He climbs the ladder by stepping upon another man's shoulder; or he builds his own building out of the fragments of his neighbor's, which he has undermined. This is often a crying injustice, and inflicts many bitter mortifications, or arouses vindictive and tiger passions. Emulation in agricultural improvement enkindles no such baleful fires. A man can make no improvements in husbandry without at once extending the knowledge and advantage of them to others. The enlargement of the capacities of the soil, and every increase of its productions, confer an immediate benefit upon the whole community.

Cheviot Sheep.—Count de Courcey saw a splendid flock of these sheep on a poor and rough mountain pasture in Southerland. He was much surprised to see these "horrible mountains and miserable pastures stocked with such fine animals, yielding on an average 5lbs. of long, beautiful wool—wethers at three and a half years old, without having eaten anything but what is to be found in these wilds, weighing alive 200 lbs." "What I have seen in this journey makes me more convinced than ever that the Cheviot breed is one of the highest merit, since they live and fatten on such land, and that, too, without adding any other food besides what these wilds produce."

Poisoned Sheep.—A traveller in Connecticut perceiving three sheep in a pasture either dead or dying, ascertained that they had been eating some vegetable poison. One died, but before the other two expired a spoonful of spirits of turpentine was administered, and they both recovered.

There are now in the United States thirty-seven million of sheep. These are worth on an average two dollars each, making seventy-four million of dollars. And the annual crop of wool is estimated at ninety to one hundred million lbs., and is worth forty million dollars; and it is said that one sixth of all these are found in the State of New York.

Scientific Agriculture.—The Baltimore American says, "We have seen a parcel of very superior red wheat, weighing 64 lbs. per bushel, which had been purchased for city grinding, and which was raised under circumstances showing what good management may effect in the agricultural line. The wheat in question was the product of a field which, a short time since, was part of the waste common that had been uncultivated for many years, and was deemed to be too poor and worn out to yield anything. After enclosing it, the present owner put lime upon it in the proportion of 100 bushels to the acre, and subsequently followed the lime with a liberal application of stable manure. The field thus prepared was sowed in wheat, and returned a crop of the very best quality, averaging 30 bushels to the acre.

Salt Your Potato Fields.—Salt is a great preservative in the vegetable as well as in the animal kingdom. The soil needs it. When on Cape Cod, last fall, we noticed that no potatoes there were afflicted with the rot. We suspected the reason might be because they were manured with sea-weed, containing salt. A friend of ours in this town sowed his garden with salt last year, and his potatoes, which had not been good in it for years, were fair, and all free from rot. Let farmers apply salt to their potato fields—sown broad-cast or applied to the hills—it can do no harm; we hope it may be found to do good. *Maine Gospel Banner.*

Plough Deep.—If you would permanently increase the productiveness and fertility of your fields, plough deep, and bring to the surface a portion of the soil never before stirred, that it may receive the fructifying influences of the sun and air. By so doing, and filling the soil with invigorating manures, you will provide a bed in which the roots of vegetables will find a healthy and salutary medium.

The New Fertilizer.—The Inverness (Scot.) Courier brings forward a statement to make stronger the truth of the old saying, that "there is nothing new under the sun;" and, with reference to guano as a manure, remarks, that it is mentioned in Robertson's "History of America," speaking of the ancient agriculture of the Peruvians, where the author says, "They enriched the soil by manuring it with the dung of sea fowls, of which they found an inexhaustible store in all the islands scattered along their coasts." And in a note he adds, "The Spaniards have adopted those customs of the ancient Peruvians; they continue to use guano, or the dung of sea fowls, as manure. Ulloa gives a description of the almost incredible quantity of it in the small islands near the coast."

Budding.—*Messrs. Editors:* For more than twenty years I have been in the practice of innoculating trees, and have, perhaps, from my extended observation, noticed some facts not generally recognized. Among other facts, it is generally agreed that innoculations may be made any time from June to October, provided the cuticle, or bark, will peel. If the operation be performed towards the end of June, or the commencement of July, and can be used in trimming the branch into which the bud is put, the latter will commence growing in ten or twelve days, and a foot or more of growth be gained the first year: the process of increment and induration, or hardening, is consummated before the advent of cold: but in most, if not all cases, when the bud is put in, in September—provided it sprouts, it will be so tender it will be easily winter-killed.—*Maine Cultivator.*

Culture of the Olive.—In a late address before the Agricultural Society of South Carolina, the Hon. Mitchell King warmly advocated the introduction of the olive in the rural economy of that State. He read a very interesting letter from J. Hamilton Couper, of St. Simon's island, Georgia, from which the following passage is extracted:

"We have succeeded perfectly in picking the olive, and in making from it the finest oil I ever tasted. This season I expect to make several hundred bottles of oil; and if I am not disappointed by hurricane, I hope this winter to submit a sample to your critical judgment. Having now about 250 trees of various ages, and intending to increase them, I hope in a few years to be able to test conclusively the question of the olive culture in Georgia. The experiment will not be a costly one, as the ground occupied by olives is cultivated at the same time in other crops."

The olive has been successfully cultivated in Louisiana, the first colonists of which State introduced with it also the vine of Champagne; all have however disappeared before the more profitable crops of sugar and cotton. Even as far northward as the eastern shore of Virginia, the pomegranate thrives, and the olive with very slight care will live and bear fruit.

Vegetable Phenomenon.—In the garden of W. Grimstone, esq., of the Herbary, Highgate, is now to be seen a pea plant in full bearing, which is remarkably illustrative of the great length of time the germinating property can continue in seeds. This plant was produced from one of three peas presented to the above gentleman by J. T. Pettigrew, esq, surgeon, of Saville Row, having been taken by the latter and the authorities of the British Museum from one of the vases recently extracted from an Egyptian sarcophagus, and where, according to computation, the vases, with their contents, must have remained for no less a period than 2814 years. The vases contained a large quantity of dust, supposed to be the decomposition of a number of grains of wheat, vetch, and other peas. Some of the grains of wheat have been sown, and found to be productive, but the vetch peas have not germinated; the other pea, resembling the British culinary pea, has in the above instance been tried effectually. The three peas were placed by Mr. Grimstone's gardener in a hot bed, and watched with great care. After some time one only was found to sprout; it gradually increased in height, growing like a sprout; at the end of each petal are three singular fangs. Each flower was of bell shape, something like a convulvulus, but not so large, from the centre of which the pods have shot forth, and are now nineteen in number and fit to gather, and they are in the shape something between our marrowfat and scimetar peas. They have of course not been tried, but it is believed they are suitable for culinary purposes, judging from the blossoms being white. Mr. Pettigrew, and several eminent botanists, scientific and other gentlemen, have seen this vegetable phenomenon, and taken great interest in it.—*London paper.*

ORIGIN OF WEIGHTS AND MEASURES.

The origin of all weights and measures in England was derived from a grain of wheat: *vide* statutes of 51 Henry III, 31 Edward I, and 12 Henry VII, which enacted that 32 of them, well dried, and gathered from the middle of the ear, were to make one pennyweight, 20 dwts. one ounce, and 20 oz. one pound. It was subsequently thought better to divide the pennyweight into 24 equal parts, called grains. William the Conqueror introduced into England what was called Troy weight, from Troyes, a town in the province of Champagne, in France, now in the Department of Aube, where a celebrated fair was held. The English were dissatisfied with this weight, because the pound did not weigh as much as the pound in use at that time in England. Hence arose the term *Avoir du pois*, which was a medium between the French and ancient English weights.

All measures of capacities were first taken from Troy weight, and several laws were passed in the reign of Henry III, enacting that 8 lbs. Troy of wheat, taken from the middle of the ear, and well dried, should make one gallon of Wine measure; and 8 such gallons made a bushel.

Avoirdupois weight was first made legal in the reign of Henry VII, and its particular use was to weigh provisions and coarse heavy articles. Henry fixed the stone at 14 lbs., which has been confirmed by act of Parliament.

With respect to measures of length, it is recorded that the various denominations were constructed from a corn of barley, three of which, well dried, from the middle of the ear, made an inch. Other terms were taken from portions of the human body, such as the digit, (three-quarters of an inch, or a fingers' breadth,) a palm, (3 inches,) a hand, (4 inches,) a span, (9 inches,) a foot, (12 inches,) and a cubit, (18 inches,) being the length of the arm or bone from the elbow to the wrist. A pace, (5 feet, or two ordinary steps;) a fathom, (6 feet, from the extremity of one hand to that of the other, the arms oppositely extended.) It is stated that Henry I, in 1101, commanded that the ulna, or ancient ell, which answers to the modern yard, should be made the length of his arm; and that the other measures of length were hence derived, whether lineal, superficial, or solid.

Weights and measures were invented 869 years B. C.; fixed to a standard in England, 1257; regulated, 1492; equalized, 1826, agreeably to the British Act of Uniformity, which took effect 1st January, 1826.

The term measure may be distinguished into seven kinds, viz: length, surface, volume, specific gravity, capacity, space, time, and motion.

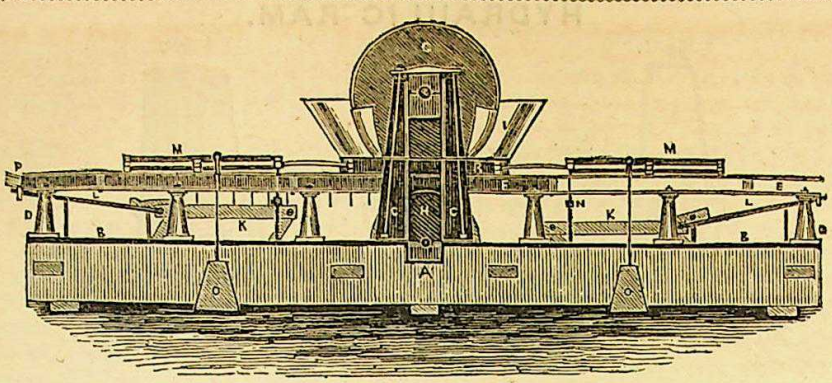
The several denominations of these measures have reference to certain standards, which are entirely arbitrary, and consequently vary among different nations.

The standard of length is a yard; surface is a square yard, the 1-4840 of an acre; solidity is a cubic yard; capacity is a gallon; weight is a pound.

The standard of angular measure and of time are the same as in all European and most other countries.

Hydrophobia cured by Vinegar.—It is stated by the London Express, that at Udina, in Friule, a poor man suffering under the agonizing tortures of hydrophobia, was cured by draughts of vinegar given him by mistake, instead of another potion. A physician of Padua got intelligence of this event, and tried the same remedy upon a patient at the hospital, administering a pound of vinegar in the morning, another at noon, and a third at sunset, and the man was speedily and perfectly cured.

Cure for the Bite of a Mad Dog.—Make a strong decoction by boiling the bark of the black ash—a well known cure for the bite of a rattlesnake; drink a wine glass full three times a day for eight days.



DRY CLAY BRICK MACHINE,

BY T. CULBERTSON, OF CINCINNATI, OHIO.

Patented, May 16, 1846.

In the above wood cut, A represents the sills upon which the machine rests; B, cast iron bed plates resting upon and bolted to the sills; C C, posts which sustain the press wheel G; D D, posts upon which the slides E rest, and through which they are strongly bolted to the bed plates; F, carriage containing 14 moulds, each of which is provided with a movable bottom, or follower, which rests upon the bottom plate of the carriage. To each of these followers two stems are attached, which project through the bottom plate. The carriage is guided in its movements by embracing the four slides E, and receives the reciprocating motion from a crank or other mechanical equivocal movement, by means of a connecting rod or pitman, P. The extent of the motion to the carriage is such, that the whole set of moulds pass under the press wheel, G, each way, thus equalizing the density of the brick. The press wheel, G, is placed vertically over the bearing roller, H, and above the moulds; its journals turn in boxes, which are strongly secured between the vertical posts, C C. H is a friction or bearing roller, upon the periphery of which the mould carriage rests, and is sustained under the pressure necessary to force the clay into the mould; I, hoppers into which the clay is thrown; R, clay box upon which the hoppers rest, and in which the press wheel works. This clay box is made fast to the posts, C C, its lower edges being as near to the face of the moulds as possible, so as not to rest upon them. In each end of this clay box a knife is placed ranging with the face of the moulds, so as to shave off all the surplus clay; K K, parallel levers, to which are attached rods L L, upon the ends of which nuts or washers are placed in such position as to be struck by and carried forward and up with the carriage, as seen on the left. Thus raising the brick out of this end or half of the moulds by the horizontal movement of these levers corresponding with that of the carriage, all tendency to cant the followers, strain or bind the stems, is avoided. As soon as the brick have been carried up above the upper surface of the moulds, a projection on the side of the carriage comes in contact with and moves an arm on the vertical rocking shaft, N, which has another arm that gives a lateral movement to the parallel levers, M, by which the brick are shoved off the carriage on a table. The bars, M, are brought back to their original position by the weights, O O.

Various efforts (says the inventor) have been made, for a series of years, in this and other countries, to apply machinery to the manufacture of bricks, for the purpose not only of economizing time and labor in the process, but to secure an exactness in shape and edge not attainable in moulding by hand. In these experiments, the practicability of making brick by compressing clay in its natural state has been fully tested. Brick made in this way have been subjected to various tests, and have proved to be fully equal for all purposes to those made in the ordinary way. In the numerous machines invented for this purpose, difficulties have arisen which rendered their operation partly or wholly impracticable—some from their complication and liability to get out of order, others from the great expense of construction, but most from a failure to produce a uniform pressure. In this machine all these difficulties have been overcome. It costs but little, is strong, simple in its construction, has but few wearing surfaces, requires but little to drive it, and but a few hands to attend it. It is self-feeding and self-delivering, and operates with great certainty and accuracy, and will make with ease 3,000 brick per hour, requiring no preparation of the clay, and no yard room for drying, as the bricks are sufficiently hard to stick up in the kiln at once. The brick are of a uniform size and shape, are harder, smoother and stronger, and being less porous, will absorb much less water; and it is also a well established fact, will stand fire better than those made in the ordinary way. The pressure being gradual and continuous, allows the air to escape freely as the clay is forced into the moulds; and as each mould passes twice under the cylinder, first in one and then in the other direction, receiving clay from the hoppers each way, the brick is not only full and perfect in all the corners and edges, but the different particles of clay are by this rolling or kneading process completely united. Indeed, it cannot be otherwise, as the pressure obtained in this way is more than equal to 100 tons to each brick—a pressure which covers clay, apparently dry, with a coat of glossy moisture. By a slight alteration of the moulds alone, brick of any desired size or shape may be made, for paving, lining cisterns, building arches, &c. The machines are so constructed that they can be taken to pieces and put together with great facility, thus rendering them portable. As the works will all be under cover, brick can be made as well in wet as in dry weather; they can also be made earlier in the spring and later in the fall than in the ordinary way.

We have not seen this machine in operation, but have seen a brick made from it, which accords with the statement made by the inventor. We have an article, also, in preparation, upon the subject of the use of dry brick instead of those that are burnt, in the erection of cottages and cheap dwellings, which will be inserted in a future number.

These machines are now in successful operation in Cincinnati, O., Covington, Ky., and Pittsburg, Pa.

Cure for Burns.—Take the balsam of fir one-third, and two-thirds sweet oil; apply it with a feather; then spread it on a thin cloth, and apply it to the burn. It is said that this remedy is complete, and leaves no scar. Common tar is said to be equally effective.

HYDRAULIC RAM.

Fig. 1.

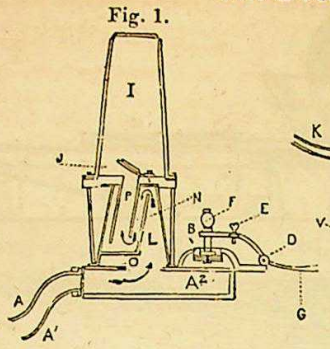


Fig. 2.

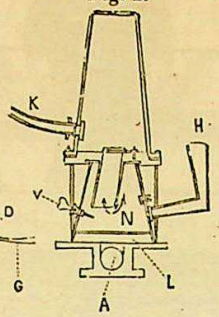
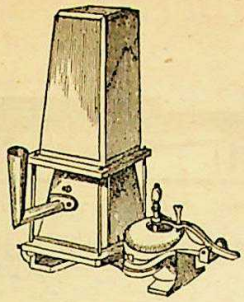


Fig. 3.



Specification of letters patent granted to JOSEPH C. STRODE, *of East Bradford township, Chester county, State of Pennsylvania, for an improvement in the hydraulic ram, called "Strode's Pneumato-Hydraulic Engine."*

[Patent dated March 27, 1847.]

The nature of my invention and improvement consists in making use of a column of condensed air between the propelling fluid and the fluid that is to be raised; said air being condensed in a pyramidal shaped chamber, by means of the momentum of a descending column of water; said chamber having a communication, by a small opening at its top, with another chamber, into which the spring water, or fluid to be raised, is introduced, called the spring water chamber, and upon which the condensed air in the first named chamber is made to act, causing said fluid to rise through a tube placed in the spring water chamber, (open at its lower end, and closed alternately at its upper end, by means of a valve,) into a large air vessel, or receiver, of the usual form and construction, being conducted thence to its place of destination by pipes, or hose, in the usual manner.

Fig. 1 is a longitudinal section.

Fig. 2 is a transverse section.

Fig. 3 is a perspective view.

Similar letters in the several figures refer to corresponding parts.

A is the main pipe for conducting the propelling water from the head, or reservoir, to the pyramidal air chamber. This pipe descends below the level of that portion of it which connects with the air chamber just before it reaches the said chamber, and then ascends, in a curved line to it, forming a curved bend in the pipe, as at A', for the purpose of preventing the air received at the valve B, during the time in which the vacuum is produced in the air and water chamber, as hereafter described, from filling the pipe A, as the air will not descend at said bend in the tube, so that the surplus of said air, after having filled the condensing chamber L, may be carried off, by the current of water, through the valve B.

The pipe A is enlarged below the air chamber L, as at A², and has an opening O into the air chamber L, through which the water passes when the valve B is closed.

B is a valve attached to a curved, vibrating lever C, turning on gudgeons D, in boxes, as its fulcrum, having a set screw E, for regulating the descent of the valve, and a counter-balance F, for adjusting the valve. When this valve B is down, as shown in figure 3, the water from the head flows through the opening, which it closes; when it is up, as shown in fig. 1, the water rises into the pyramidal chamber L, through the opening O, and condenses the air therein.

H is a pipe for conveying the spring water to the spring water chamber. I is the air chamber into which the water is forced. J is the valve for holding it. K is a pipe, or hose, for conveying the water to its place of destination. The above named parts, lettered from A to K, inclusive, are made and operated in the usual manner. The improvements are as follows:

L is a pyramidal chamber into which air is admitted through the valve B, when it descends by the pressure of the external air, to supply the partial vacuum created in the pipe A, and chambers L and N.

This pyramidal chamber has a communication, by a small opening M at the top, with another chamber N, called the spring, or pure water chamber; through which opening M, the air, so condensed, is forced, and presses on the spring, or other water, introduced into the same through the pipe H, by which pressure, the water in said spring water chamber is forced upward through a tube P, reaching to near the bottom of said chamber N, through the valve J, into the air chamber I; said valve being represented as open in fig. 1, and as closed in fig. 2.

To raise water with this machine, open the valve B, and let the water flow out; then, by closing the valve B, the water, which is now in motion in the pipe A, will pass through the opening O, into the pyramidal condensing chamber L, and condense the air the same as before; the condensed air will force the spring water up the tube P, (which had entered through the pipe H during the continuance of the partial vacuum above spoken of,) into the chamber I, and condense the air therein, until its density is equal to that in the condensing chambers L and N, below; at this time the spring water will cease to flow into the air chamber I, the valve J closes, and the air in the chambers I, L, and N, commences expanding, that in the lower chambers, L and N, giving motion to the propelling fluid and driving it backward, producing a partial vacuum in the machine, and the air in the upper chamber I, forcing the spring water to its place of destination.

The said partial vacuum in the machine, caused by the reaction of the machine, as aforesaid, and the pressure of the external atmosphere on the valve B, will cause it to open again. The water from the head then flows through this valve with an accelerating movement, until it has acquired that degree of velocity as to cause the valve to close. The water having no longer any vent through the valve B, passes through the opening O into the pyramidal air chamber L, and repeats the operation above mentioned successively.

In this manner the operation will continue as long as the machine remains in order, and there is a head of water to propel it. The valve V is for the purpose of suppling the chamber I with air, by admitting said air into the tube P. The said air is admitted during the time that the partial vacuum above mentioned takes place. The air thus introduced into the tube P ascends to the top of the same, and is forced into the chamber I at the next stroke of the machine; said valve V is represented open in fig. 2, and may be closed, or regulated, by screwing the thumb-screw V.

The principal advantages this machine possesses over other machines are,

1st. In case of forcing up pure water by the propelling pow-

er of a running stream of water less pure, there is no possibility of the impure water mixing with the pure, there being at that time a column of condensed air between the two waters.

2d. The water being forced into the upper chamber I, by the condensation of air in the lower chamber, the valve J opens more slowly than when water alone is made the propelling medium, and also shuts more slowly, thereby preventing the water from escaping back through the valve J after it is forced up—the valve J being nearly closed when the water ceases to flow upward into the chamber I. This advantage, upon trial, is found to be of considerable importance, enabling the machine, thus operated, to force, with a given quantity of water, several barrels more of water per day than it would otherwise do.

3d. There being no valve between the condensed air in the lower chamber and the driving water, or at the opening O, said air is permitted to act a longer time in forcing back said driving water, and thereby making a more complete vacuum than in other machines, and rendering useless the spring for opening the outlet valve B, as used in several machines.

It is not necessary that the spring water chamber N, and the air chamber L, should be enclosed by the same envelope, but they may form separate chambers, and they may be arranged in any convenient way or manner most acceptable to the constructor, provided that the capacity of the air chamber does not exceed a due ratio between the propelling power and the water to be raised.

I wish it to be understood that, in the construction of these machines, I do not wish to confine myself to the form of a hollow frustrum of a pyramid, cone, or other form, for the several chambers, &c.; but I desire the privilege to vary these as I may think proper, in form, proportion, and material; provided, in all cases, that the surplus air be carried off through the valve B. I, however, prefer the forms above described, when pure water is to be raised with impure water.

What I claim as my invention, and desire to secure by letters patent, is,

1st. Making use of a column of condensed air between the propelling fluid and the fluid to be raised, in the manner above described, or other mode substantially the same, by which analogous results are effected.

2d. I claim the particular combination of the pyramidal air chamber L, the internal spring water chamber N, and the water tube P, with the curved conducting pipe A′, and valve B, and the air chamber I, and hinged valve J, constructed and arranged in the manner and for the purpose substantially as set forth.

The above are manufactured and for sale by H. P. M. Birkinbine, No. 17, south Eighth street. One may be seen in operation at his shop in Shoemaker street, running east from Eighth, a few paces south of Market street, Philadelphia.

The subscriber is now prepared to sell county or State rights, which will be accompanied with small operating models, when desired.—Letters, post-paid, addressed to him at Philadelphia, or to John Hickman, esq., West Chester, Pennsylvania, will be attended to. JOSEPH C. STRODE.

The First Ship.—The ark built by Noah was the first, as well as the largest vessel, of which we have any account. Her tonnage was nearly ten times greater than that of the largest ship-of-the-line in our navy, being estimated at 42,400 tons. Her proportions would be considered good even now, after the accumulated experience of ages in ship-building, although her model may not have been the best adapted for speed. Allowing 18 inches to one cubit, her length was 450 feet, 75 feet beam, and 45 feet depth of hold.

(Continued from No. 4, page 98.)

LEGAL INTELLIGENCE.

KNIGHT *v.* GAVIT.

In the Circuit Court of the United States, for the Eastern District of Pennsylvania, October session, 1846.

R. B. Knight, Jno. Cadwalader, Wm. M. Meredith, and Geo. M. Dallas, Esqs., for the plaintiff.

H. Hopkins and H. J. Williams, Esqs., for the defendant.

CHARGE OF THE COURT.

Kane, J. charged the Jury as follows:

This is an action of trespass on the case brought by Abijah L. Knight to recover damages from Nelson Gavit, for an alleged breach of patent right.

The plaintiff has presented letters patent under the seal of the Patent Office of the United States, duly attested, bearing date 25th of September, 1839, by which there was granted to William and Abijah L. Knight, and Edward F. Condit, their heirs, administrators, and assigns, the exclusive property in a new and useful improvement in the machine for making paper, of which a description is particularly given in an accompanying schedule.

The plaintiff claims to be at this time, and to have been at the time when this suit was instituted, the sole owner, in law, of this patent right. The former interest of Mr. Condit having been regularly transferred to him on the 22d of May, 1841, and the former interest of William Knight, in like manner transferred to him on the 15th of December, 1842.

The latter transfer, however, was by a conveyance in trust, and the defendants have objected that, on that account, as well as because it was not recorded within the time directed by the act of Congress, the conveyance did not pass such a title as would authorize the plaintiff to sue in his own name as assignee of that interest. This question, however, is one to be settled by the Court, not by the Jury. For the purposes of your deliberations and verdict, you will assume that the conveyance by William Knight to the plaintiff did pass to him all the legal rights of the assignor; and that so far as this question is involved, the plaintiff must be regarded by you as if he had been named alone in the patent.

It has been contended however, at a late moment in the cause, that the plaintiff ceased to be the owner of the interest which he derived from William Knight, at some time prior to the 28th of April, 1843, when he settled his accounts as assignee, and charged himself with the proceeds of sale of the assigned estate. You have seen the entry in the accounts, and have heard the evidence of Mr. Fallon as to the circumstances and purpose of making it. It only remains for the Court to instruct you, as it does, that if upon the evidence you believe that no sale was in fact made to a third person, but that the plaintiff took the interest of William Knight, at its appraised value, the transaction has not been such as to impair his right to maintain this action—that is to say, if you shall be of opinion that the plaintiff did in fact sell to some third person, at the time referred to, the interest which he had acquired under his father's assignment, so as to pass away his legal title in that one-third of the patent; then the plaintiff has failed to establish the title which he has set forth in his declaration,* and your verdict will be for the defendant; if, on the other hand, you are not satisfied that such a sale to a third person, has been made out by the evidence; then you will proceed to the further consideration of the case, leaving the creditors of William Knight to assert hereafter, as they may do, any right

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Note by the Reporter.—It had been suggested, in argument, that the plaintiff, as admitted proprietor of two-thirds of the patent right, might, independently of the objection, have sued, in his own name, for his damages sustained as such partial proprietor, if his title had been thus set forth in the declaration.—(See 11 Ad. and El. 209.)

they may have to a participation in the benefits of the patent right.

The question of title, under the letters patent, being thus disposed of, the next topic of consideration is the patent itself, its import, the adequate clearness in which it is expressed, and the utility of the improvement it professes to recognize.

The import of this patent may be determined, without difficulty, from the instrument itself, when construed according to the known rules of law. It therefore becomes the office of the Court to declare what that import is; and it will be the duty of the Jury to accept the interpretation as given by the Court.

In interpreting a written instrument all its parts are to be taken together; and in the present case, the drawing, which forms part of the specification, is to be taken with the rest.

It is obvious, that the specification and drawing before us relate to a machine of two parts or divisions, the first of which regards the construction of wet paper from the pulp, and the second the completion of the process of manufacture, by drying, consolidating, and finishing the material derived from the first. It is only the latter of these parts which gives rise to the present controversy, and to this alone therefore our enquiries may be confined.

The parts of the specification which describe this portion of the machine are found on the four last pages of the printed copy.* After describing that which may be styled the wet machine, and the progress of the pulp paper to the drying cylinders, it goes on as follows:

[With the drawing before the Jury, the learned Judge here read slowly the parts of the specification.]

Taking all this together, it asserts the invention by the patentees of a combined machine, the several parts of which are not claimed as new. The plaintiff has requested us to charge you, that this combined machine "is a machine to finish paper, by the repeated contact of heated metallic cylinders acting with graduated temperature and pressure, on the naked sheet while damp, in successive stages of the drying process, with an intermediate adaptation of former modes of alternately shifting the side next to the drying surface of the cylinders."

This definition the Court is prepared to adopt. It is, perhaps, however, too concise to be apprehended at once clearly. The object of the machine, as we have said, is the completion of the process of manufacture by drying, consolidating, and *finishing*. It does this by employing a series of heated metallic cylinders, of which the heat is susceptible of graduation, and which are so arranged as that some of them shall be pressed upon by the others, with regulated degrees of pressure. The naked paper, while yet damp, is made to pass alternately around and between these cylinders, and is thus progressively dried and consolidated by the heat and the pressure which it derives from them through the successive stages of the process; the two sides of the paper as it passes, being presented alternately to the heated surface of the cylinders, as in other well known machines for drying paper.

Such, in the opinion of the Court, is the import of the specification for the purposes of this cause; and it submits to you that the principle of the combined machine is, therefore, the repeated action of heat and pressure, applied alternately and directly, upon the material, in degrees adapted to its progressive character.

The number of the cylinders, except so far as it is implied in the successive character of their action, their exact relative position, provided it be not incompatible with the purposes for which they are employed, their precise dimensions, the fact that some of them may at the option of the workman be made, on occasion, to revolve without absolute contact, and the manner in which this may be effected, the arrangements for graduating the heat and the pressure; these and numerous details, which in the form of illustrations, suggestions of preference, or otherwise, find a place not improperly in the specification, are not looked upon by the Court as essential parts of the machine: these regard matters independent of its principal and substantive character.

In thus defining the extent of the patented improvement, it will be observed that the Court does not limit its view to the formal words of claim with which the specification closes. On the contrary, finding that those words "claim" in the name of the patentees, "the arrangement of the drying cylinders, for the purpose of drying and pressing the paper, *as herein described*," the Court looks to the description thus expressly referred to by the patentees, and deduces from it, and from the drawing which makes part of it, the entire improvement which it was their object to secure to themselves by patent.

The construction of the letters patent thus given by the Court, will be accepted by the jury as correct. Its errors, if they exist, can all be repaired, and their consequences be made innoxious by a revisory tribunal.

The next question is one for the jury, upon the evidence before them. Is the specification, with its accompanying drawing, such a description of the patentee's improvement and of his mode of using it, as to enable any person skilled in the arts of machine building and paper making, to make, construct, and use the same? On this question the Court is not aware that it can aid the deliberations of the jury. So far as the evidence is recollected, the numerous witnesses on both sides, who have spoken of the patent, have none of them adverted to any obscurity in the terms of art which it employs, or to any substantial difference between the machine as described and the machine as made. The question however is with you. If the description and drawing are not such as might enable a skilful artist to construct the machine, you cannot find a verdict for the plaintiff.

The next question regards the utility of the plaintiff's alleged improvement. Upon this also you will pass, as the evidence may direct you. If it be merely frivolous, or essentially pernicious, the law gives it no protection: if, on the other hand, it be practical, and not injurious to the interests of society, a difference of opinion as to its degree of usefulness, as compared with other machines, will not affect the rights of the patentees. On this point, the evidence of Mr. Phelps, Mr. Moore, Mr. Thomas, Mr. Towne, and others, will present itself to your minds as entitled to very great weight.

The issuing of the patent, upon the oath of the alleged inventors, is prima facie evidence of the novelty and originality of the invention. If, therefore, upon the points which I have mentioned, the conclusions to which your minds arrive shall be favorable to the plaintiff, it will remain for him to show that his rights have been infringed by the defendant.

There is no dispute of the fact that since the issuing of the plaintiff's patent, and the vesting of the title in the plaintiff, and before the institution of this suit, the defendant did make a machine for Messrs. Wilcox, of Delaware county, of which the model is before you—and which machine was, and now is, in use for drying and finishing paper. If that machine was an infraction of the plaintiff's patent, the plaintiff has made out his case, and must have your verdict, unless the defendant can show good cause to the contrary.

Was, then, the machine made by the defendant for Mr. Wilcox an infraction of the plaintiff's patent—or, in other words, is it or is it not, substantially and in principle, the same which is described in the plaintiff's patent?

In determining this question, you will have reference to the import of the plaintiff's specification, as it has been presented to you by the Court. Is, or is not, the machine, made by the defendant, "*a machine to finish paper, by the repeated contact of heated metallic cylinders, acting with graduated temperature*

* A pamphlet copy used at the trial.

and pressure, on the naked sheet, while damp, in successive stages of the drying process, alternately shifting the side next the drying cylinders?" Is it substantially such a machine?

The question is not, whether the two machines are identical in form, or whether they are equally perfect in their adaptation to use. It is the commonest of all devices, with those who seek to defraud a patentee, to give a novel exterior to their piracy, to modify forms, introduce new parts, or omit old ones, to change the positions of the parts, and generally to mask their violations of the patent right as best they may. Sometimes the patent machine is made better by these variations, more frequently it is made worse. But all this is not of any moment to the discussion of an alleged infraction. Courts and juries look through the artifice of dress to the essential substance, and decide by reference to the substance alone.

This is the law in regard to combinations of machinery, as well as those which may be, in common language, spoken of as simple. All machines, for which a patent can be sustained, are in truth combinations of known elements: the only simple ones are those which we call the mechanical powers. The question, therefore, which you are to decide, is, whether there has been a substantial violation of the plaintiff's rights as the owner of the patented combination.

To determine this, you will compare the two machines, and will weigh the evidence of the different experts who have been examined; and having done this, you will apply the law, as laid down by the Court, to your conclusions of fact.

The defendant's counsel has asked the Court to charge you, that machines in which the drying cylinders do not touch, may be made without violating the plaintiff's patent. The Court has no difficulty in so instructing you; regarding, as it does, the contact of the cylinders, except so far as they may be separated by the sheet which passes between them, as an essential part of the patented machine.

The Court has been further asked by the defendant's counsel, to instruct you, that "making a machine with screws under the journals of the drying cylinders, so as to separate them, is no violation of the plaintiff's patent:" and "that if such a machine be made with screws under the journals, by which the drying cylinders may be kept apart, the machinist is not responsible for a violation of the patent right, although the purchaser should lower those screws, so as to allow the cylinders to come in contact."

The Court is not aware that any evidence has been presented, to which the instructions asked for can properly have application. But inasmuch as the request addressed to it implies that, in the opinion of the highly respectable counsel, there has such evidence been adduced, the Court will submit its views of the law on these points—the more readily, as the principles involved are, in its judgment, altogether elementary.

If the machine, as made by the defendant, was not an infraction of the plaintiff's patent, the alteration of it by a third person will not make the defendant liable for an infraction to which he was not a party. But if the machine, as made by him, was intended by him to operate in such a way as to violate the patent, and has in fact so operated, he was a party to the infraction, notwithstanding the ingenuity with which he may have sought to disguise his wrong. The introduction of screws under the journals, by which parts of the machine were for the time kept separated, which the purpose and uses of the machine required to be in contact, might be justly regarded by the jury as an illustration of this misdirected, and, in the result, profitless ingenuity.

So, the maker and vender of a patent lever watch, a combination of machinery, set in motion by a spring, and indicating the time of day by hands upon a dial plate, might infringe the patent for that invention, though at the time of selling the machine he had detached the hands from the dial, or omitted to wind up the spring.

The law would be valueless, if it could be eluded by devices like these. No machine maker, however determined to violate a patent right, would fail to leave some corner of his work unfinished, some spring unwound, some screw unadjusted, if, by so doing, he could escape the responsibilities without impairing the profits of his unlawful act.

The Court submits to you the question as one of fact, whether the defendant did make a machine similar in principle and substance with that of the plaintiff, as the Court has defined it. If you find that he did, then the defendant is put upon his defence.

By the 15th section of the act of Congress of 1836, the defendant, in an action like the present, is permitted to avail himself of various matters of defence, upon giving notice of them in writing to the plaintiff thirty days before the trial. Among these, are included facts tending to show that the patentee was not the original and first discoverer of the thing patented, or that it had been described in some public work anterior to the supposed discovery thereof by the patentee. If, however, the defendant relies, under this section, on the fact of a previous invention, knowledge, or use of the thing patented, he is required to state, in his notice of special matter, the names and places of residence of those, whom he intends to prove to have possessed a prior knowledge of the thing, and where the same had been used.

In accordance with this section, the defendant, thirty days before the trial, gave notice, that the subject-matter of the plaintiff's patent had been, before the time at which the patent issued, known to, and in use by, a number of persons, of whom eight were specified. No notice was given of an intention to show that the subject-matter had been described in any public work before the plaintiff's supposed discovery; and no evidence, therefore, of such publication could be presented at the trial, unless by the plaintiff's consent.

Two or three books have, however, been read without objection, and are in evidence before you; and many witnesses have been examined to establish the prior knowledge and use of the machine. From all of these, the materials are presented in reasonable abundance, to enable you to decide the great question of the cause, viz: the novelty of the alleged invention.

It is not my purpose to recapitulate this evidence. The range of inquiry has been very broad; and very much of that, which appeared pertinent when introduced, has been properly passed over in the argument without notice. The only machines, which have been the subjects of much discussion before you, as of alleged similar character and prior date, are those of Howe, Carter, Ames, and Fisher. Upon each of these I shall make a few remarks, as introductory to certain instructions which it is my duty to give you on questions of law. For reasons not directly connected with this particular suit, it is my wish that, as far as may be practicable, the action of the jury on the merits of Knight's patent shall be independent of any direct expression of opinion from the bench.

First, then, of Howe's machine. This has the merit, as compared with Knight's, of unquestioned priority of device and structure, and its appearance* certainly does not contradict its date. It consisted of a single pair of unpolished cylinders, heated by the rudest of all possible representatives of a steam boiler, without a safety valve, until the unconsidered contingency of an explosion suggested the substitution of hot bars of metal as a less dangerous resort. "That didn't answer, however, so well as the steam," and at last a common stove was introduced below the machine, one of the cylinders acting as a revolving smoke drum. It dried wrapping-paper imperfectly—a thinner variety of coarse paper somewhat better, but not perfectly—and it would seem, that when the paper on which

* Referring to the machine itself in court.

it was to act was thin or less moist than common, or when the fire was good, and the potash kettle, which served for a boiler, had not been recently filled, it also pressed the paper without crushing it. It disappeared from the category of things in practical use and application, about the year 1837, when it was discarded by the proprietor, and has since remained in a lumber garret, till it came here for the purposes of this cause.

The rudeness of structure of Howe's machine, and the primitive character of its appliances, do not, however, necessarily indicate a difference of principle between it and a more highly finished specimen of art. Yet they may do so. For if the imperfection of its surface, and the want of precision in its adjustments, unfitted it altogether for the offices that are performed by Knight's machine, then it must follow that the object of Howe's machine was different, or that it failed to effectuate its object; and if so, it cannot be legally regarded as a machine known and used before the date of the patent.

It is for the jury, looking at all the facts, to say whether this was a machine like Mr. Knight's. Whether there was that alternating succession of drying and pressing, that repeated contact of cylinders, that graduation of the heat to the exigencies of the advancing stages of the process, which we observe in his. Whether, in a word, it was adapted to finish paper, or whether it necessarily left it unfinished and imperfect.

With reference, as we suppose, to this machine of Howe's, the Court has been requested to instruct you, that "a mere repetition, or reduplication of a machine known and used, cannot be the subject of a patent, merely because the same effect is increased."

The position is, in one sense, true. If it be intended to assert that a man, who has no right to patent one machine, has no right to patent two of them, it may be conceded as indisputable. But if it be meant, that a new and useful combination cannot be patented, because the parts which compose it are similar to each other, the Court declines instructing you that such is the law. Nor is it, in the view of the Court, an objection to the claim of a patent for such a machine, that it merely increases an effect which might be imperfectly produced by a more simple one; since it may be, and often is, the case, that the increased effectiveness of a contrivance constitutes all its value. The repeated reduplication of a feather makes the feather bed—the reduplication of patches, the quilt that covers it.

We are further asked to instruct you, that "if Knight's machine is nothing but the use of two or three of Howe's machines, his patent is invalid." The answer of the Court is embodied in the remarks just made.

Again, the counsel for the defence have asked us to instruct you, that "any use, however limited, of a machine similar in principle to the patented machine, will defeat the patent." As an abstract proposition, this is somewhat too broadly expressed, according to the best judgment of the Court; but, if limited to the case under trial, it is certainly true, that all four of the machines, which assert priority over Knight's, have, according to the evidence, been so used as to invalidate his patent, if they, or either of them, can justly be regarded as the same substantially and in principle with his.

Taking these, as they appear to the Court, upon the evidence, to have stood at the date of the plaintiff's patent, they may be described thus:

[The models and drawings of these several machines were before the jury.]

1. Carter's.—Consisting of several drying cylinders of the ordinary construction, heated by steam, not in contact with each other, with a small calender roller placed above one or more of them; the calender deriving heat only from the paper, which was itself heated by the drying cylinder, around which it passed; the paper not changing sides in its progress.

2. Ames's.—A single drying cylinder, of unusually large diameter, heated by steam, with a number of rollers of cloth, canvass, lead, iron, and paper, placed around it—some of them susceptible of graduated pressure, others so fixed as to be incapable of graduation. None of them heated except from the cylinder through the paper; the paper not changing sides in its progress.

3. Fisher's.—In which the paper passed over a heated iron drier of some two feet diameter, between that drier and another of larger dimensions, also heated, and then around the larger drier.

If such be the evidence, of which the jury will judge, it would seem, 1. That in Carter's and Ames's machines, up to the time in question, the paper did not pass between heated cylinders at all, in that which may be regarded as the proper sense of the term, "heated cylinders;" for the rollers having no independent heat, but deriving all their heat from their contact with the paper, could never be hotter than the paper itself, and thus could not aid in drying it. 2. That in Carter's machine, if the testimony of Ayres and Lungren be correct, there was no succesive pressure of heated cylinders; the contact, as in Howe's, occurring only once; and that the same is true as to Fisher's. 3. That in Ames's, though there was a succession of imperfectly graduated pressures, there could be no graduation of temperature, there being but one heated cylinder from which all the rolls derived their heat. And, 4. That in neither Ames's nor Carter's were the two sides of the paper presented alternately to the drying surface.

[These observations of the learned judge were incidentally explained by reference to the models.]

The Court has indicated the particulars in which these several machines appear to it to differ from the machine of Mr. Knight. In so doing, it has not been our purpose to influence your action, but to make it more easy. You will decide upon the evidence, whether these or any other differences exist in point of fact; and if so, whether they are of form and proportion *only*, or of principle and substance also. If the machine, devised by Mr. Knight, is the same with either of those before known, this action cannot be sustained, and your verdict must be for the defendant.

Reference has been made in the course of the trial to a patent issued on the 8th of September, 1824, to Isaac Burbank, for an improvement in paper-making, called the Revolving Mould. The patent itself is for an invention altogether unlike that which is here in controversy; but it is contended that Mr. Burbank has in his specification described an apparatus similar in principle to Knight's drying machine, without, however, claiming it as part of his invention. There is no proof whatever that Burbank ever made or used the machine which he so described; or that Knight ever saw or heard of the description; and the Patent Office having been burnt some three years before Knight's patent was applied for, and Burbank's patent not having been since recorded anew, there is no ground on which an inference of fact, still less a presumption of law, can rest adverse to the originality and integrity of Knight's invention. Independent of all which, the Court does not feel itself justified in instructing you, that a man who patents his invention is bound to take notice, at his peril, of all that all prior patentees have seen fit to mix up with the specifications of their supposed inventions. It is enough, in all reason, for any one mind, to inform itself of all the supposed inventions really patented, with their appropriate specifications.

The descriptions and drawings in the books which have been read to you, will next claim your attention. In examining them, you will be careful to ascertain whether the machine for which a patent is here claimed, and not some other, differing either in its essential structure or purpose, has been the subject of description. If the plaintiff's machine had been described in

some public work anterior to his supposed discovery, he cannot recover in this action.

If, on the other hand, you shall be of opinion that he, and those to whose rights he succeeds, were really the inventors of the improvement for which he holds a patent; that he has not sold his legal interest, or any part of his legal interest in the patent; that the invention has been honestly and adequately set forth in his specification and drawing; that it is useful, and that the defendant has made and sold a machine which is substantially and in principle the same as his; in such case, your verdict will be for the plaintiff, and you will proceed to inquire what damages he has sustained.

The measure of damages, in a case like this, can scarcely be defined in precise terms. They should be compensatory, not vindictive. The object is not punishment, but it is full indemnity. The amount of profit which the defendant has derived from the infraction, is one of the elements to be regarded; but the amount of loss and injury which the plaintiff has sustained, should be regarded also. Among other things, the expense and toil incident to the prosecution of a suit like this ought to be fairly considered; the plaintiff ought not to be made a loser by the assertion of his rights. In the words of the law, your verdict will be for such an amount as you believe to be "the actual damages sustained by the plaintiff."

The counsel for the parties respectively have asked the Court to instruct you in several legal questions. Some of these have been already adverted to. On the rest, we will now advise you, according to our best judgment.

So far as the plaintiff's points have not been answered; the jury are now instructed as follows:

1. If the terms of art contained in the specification are ordinarily used and applied as testified, and if the jury believe that the varying texture of the damp sheet during the drying process, as described by the witnesses, renders such repetition of contact of the driers, as is described in the specification, a process adapted to the successive conditions of the sheet, and useful in converting it into finished paper in the manner testified, the plaintiff's interpretation of the specification is correct in point of law, and his patent is valid, if original.

2. If the machines designated as Carter's, Howe's, and Fisher's, respectively, operated, as has been testified, without successive graduation of either heat or pressure, neither of these machines was identical with the subject of the plaintiff's patent.

3. If the machine designated as Ames's was constructed, as has been testified, the impossibility of successive graduations of temperature at the respective stages of dampness of the paper at which the sheet underwent pressure, and the incapacity of the machine to admit of a change of the side next to the drier, during the continuance of the process, render this a different machine from that which is the subject of the plaintiff's patent.

Of the defendant's points, the 7th, 8th, 9th, 12th, 13th, and 14th, have been answered by the Court in the charge already given. The 18th has also been answered, so far as it regards the case. The 1st, 2d, 3d, and 15th points, are answered in the affirmative. So also is the 4th, meaning of course the owner of the legal title; for whatever may be the equitable rights of others, the legal owner may maintain suit.

The remaining points of the defendant are answered as follows:

5. It is evidence to go to the jury, with the other evidence that leads to the opposite conclusion. It is not conclusive: the jury are to say whether plaintiff sold to a third person, or took to himself at the appraised value: unless he sold to a third person, the action is well brought.

6. *Answered in the affirmative;* but a substantial violation is enough: the forms and proportions are not essential.

10. The Court has construed the patent in the charge, and has nothing to add to what has been said.

11. His patent is not invalid, on the supposition which the point presents, if the plaintiff's combination of machinery for that purpose was new.

16. Not so. The combination stated is for drying and pressing, "*as described*" in the specification, and the patent is coextensive with the specification.

17. Not so. If the patent was not on record, or known to him before his patent, it does not *per se* invalidate his patent, as to a matter not patented in the previous patent, or claimed in it as an invention of the patentee.

18. Answered in the charge, so far as it regards the case.

19. The defendant's counsel having explained this by reference to the 9th section of the act of Congress of 1837, contends that the words "*thing patented,*" as there used, cannot, in any case, be applied to a *combination.* The instruction, as requested, is refused.

20. If the machine was never used, the damages should be merely nominal, as against the maker; if it has been sold by him and used by others, the verdict should be for the damages actually sustained by the plaintiff, without exclusive reference to the profitableness of the use by the wrong-doer, or the length of time such use may have continued.

The jury found a verdict for the plaintiff.

Damages $1,500.

Misdirected Ingenuity.—Mr. Warner, an ingenious watchmaker and jeweller, who occupies a stand at the Polytechnic Institution, has completed the model of a high-pressure steam engine, so small that it stands upon a four-penny piece with ground to spare! It is the most curious specimen of minute workmanship ever seen, each part being made according to scale, and the whole occupying so small a space that, with the exception of the fly-wheel, it might be covered with a thimble. It is not simply a model outwardly, it works with the greatest activity by means of atmospheric pressure, (in lieu of steam,) and the motion of the little thing as its parts are seen laboring and heaving under the first influence, is indescribably curious and beautiful. Some months have been expended upon the structure of this lilliputian engine by Mr. Warner; and the difficulty of the undertaking may be easily conceived, when it is remembered how minute the valves, pistons, sockets, screws, and hidden apparatus must be, and how accurately they must be moulded and fitted, to insure unbroken functional motion. It is altogether a pretty toy, and an extraordinary instance of what patience, perseverance, and expert artisanship, can accomplish. But Mr. Warner is a practised hand at such curiosities. His cases abound with articles manufactured for elfin use. He has scissors so minute that some hundreds of them go to the ounce; and there are knives belonging to the same family, which, small as they are, open and shut with a smart click. Quantities of other things are there of a like kind, made with the greatest neatness, requiring eyes of microscopic clearness to ascertain their full perfections. Mr. Warner, we should imagine, works exclusively for the fairies: no doubt he is entitled, by letters patent, to wear Oberon's arms over his door.—*Mechanic's Magazine.*

Manufacture of Watches at Geneva.—The manufacture of watches, musical boxes, and jewelry, is that to which Geneva owes its present prosperity. Upwards of fifty workshops, devoted to watchmaking, and seventy to the jeweller's trade, are kept in constant employment; and it has been calculated that in good years, seventy-five thousand ounces of gold, five thousand ounces and marks of silver, and precious stones to the value of a million of francs, are used in them. One hundred thousand watches are said to be now annually manufactured in Geneva.

LIST OF PATENTS FOR APRIL AND MAY, 1846.—[CONTINUED.]

	Date of Patent.
Cutting screws for beadsteads and chairs, improvement in, by Hezekiah P. Nuckles, Glasgow, Ky.,	April 4, 1846
Railroad gates, improvement in, by David Percival, Middletown, Del.	April 4, 1846
Attaching horses to one-wheeled carriages, improvement in, by John R. Rimmington, Lowndes co., Ala.	April 4, 1846
Filtering cock, improvement in, by Tho. F. Wenman, N. Y.	April 4, 1846
Frames of travelling trunks, improvement in, by Patrick Fitzsimmons, West Troy, N. Y.	April 4, 1846
Filtering cocks, improvement in, by Jonathan F. Ostrander, N. Y.	April 4, 1846
Spiral propellers, improvement in, by Pennel Woodcroft, Manchester, England,	April 4, 1846
Checking the momentum of printing presses, improvement in, by Alva B. Taylor, New York	April 4, 1846
Registers for stoves, improvement in, by Washburn Race, Seneca Falls, N. Y.	April 4, 1846
Spring-tooth horse rakes, improvement in, by Lorin M. Whitman, Pike, N. Y.	April 4, 1846
Machinery for rinsing calico, &c., improvement in, by George J. Prentiss, Tiverton, R. I.	April 4, 1846
Paddle wheels, improvement in, by Daniel Deshon, New Landing, Conn.	April 4, 1846
Car wheels, improvement in, by Tho. Glasco, Wilmington, Del.	April 4, 1846
Brick presses, improvement in, by Joel L. Ransom, Mill Port, New York,	April 4, 1846
Churn Dashers, improvement in, by Charles King, Scipio, N. Y.	April 4, 1846
Spring lancets, improvement in, by Jacob H. Gemrig, Philadelphia, Pa.	April 11, 1846
Brick presses, improvement in, by Tho. Hartley, Pittsburg, Pa.	April 11, 1846
Door locks, improvement in, by Joshua H. Butterworth, Dover, N. J.	April 11, 1846
Electro-magnetic telegraphs, improvement in, by Samuel F. B. Morse, N. Y.	April 11, 1846
Light-house lamps, improvement in, by Charles Wheeler, Rockport, Mass.	April 11, 1846
Stretching leather bands, improvement in, by William Kumbel, N. Y.	April 11, 1846
Saw mills, improvement in, by Tho. J. Wells, N. York	April 11, 1846
Making bricks, improvement in, by Samuel Lowery, Philadelphia, Pa.	April 18, 1846
Machinery for smoothing tobacco leaves, improvement in, by George W. Macon, Lansingburg, North Carolina	April 18, 1846
Cultivators, improvement in, by Nathan J. de Shelby, N.Y.	April 18, 1846
Corn shellers, improvement in, by Waldren Beach, Baltimore, Md.	April 18, 1846
Reaping machines, improvement in by Clinton Foster, Laport, Ia.	April 18, 1846
Pocket books and watch safes, improvement in, by Joseph Colton, Amherst, Mass.	April 18, 1846
Extensive beadsteads, improvement by C. S. Debow, N. Y.	April 18, 1846
Magnetic printing telegraphs, improvement in, by Royal E. House, N. Y.	April 18, 1846
Ploughs, improvement in, by Samuel Witherow, Gettysburg, Pa.	April 18, 1846
Regulating draft of ploughs, improvement in, by Joshua M. C. Armsby, Worcester, Mass., (assigned to Ruggles, Nourse, and Mason.)	April 18, 1846
Pumps, improvement in, by David G. Colburn, Wilmington, Vt.	April 25, 1846
Casting spoons, improvement in, by Joel Hall, 2d., Wallinford, Conn.	April 25, 1846
Hemp dressers, improvement in, by Barnaby Langdon and Amos Salsbury, Troy, N. Y.	April 25, 1846
Curry combs, improvement in, by Wm. Wheeler, West Paulding, Vt.	April 25, 1846
Water wheels, improvement in, by James Deniston, Lanier, Ohio,	April 25, 1846
Machinery for making hat bodies, improvement in, by Henry A. Wells, N. Y.	April 25, 1846
Grinding mills, improvement in, by William Broughton, London, England,	April 25, 1846
Water wheels, improvement in, by Ralph Summers, Senica Falls, N. Y.,	April 25, 1846
Way mail bags, improvement in, by Henry Johnson, Washington, D. C.	April 25, 1846
Printing calico, improvement in, by Robert Ferguson, & John Clark, Glasgow, Scotland,	April 25, 1846
Tailors' measures, improvement in, by Henry Donges, Newport, Pa.	April 25, 1846
Grinding mills, improvement in, by Jonathan F. Ostrander, New York,	April 25, 1846
Composition for stereotype plates, improvement in, by Josiah Warrin, New Harmony, Indiana	April 25, 1846
Drying sized paper, improvement in, by Joshua Norton, Jr. Boston, Mass.	April 25, 1846
Machines for making bricks, improvement in, by J. Simpson, Decatur, Georgia	April 25, 1846
Ploughs, improvement in, by Harvey H. May, Galesburg, Illinois	April 25, 1846
Making cores for casting, improvement in by Isaac Kellogg, Hartford, Ct., assigned to Henry Kellogg	April 25, 1846
Hay presses, improvement in, by Daniel R. Allen, Cumberland, Maine.	April 25, 1846
Machinery for rolling tobacco, improvement in, by Wm. P. Marston Danville, Va.	April 25, 1846
Hommony making, improvement in, by Wm. Y. Singleton, Springfield, Illinois.	April 25, 1846
Ventilators for chimneys, improvement in, by Michael Collins, Boston, Mass.	April 25, 1846
Ploughs, improvement in, by John M. May, Philadelphia, Pa.	May 2, 1846
Lamps, improvement in, by John Street, Philadelphia, Pa.	May 2, 1846
Bolting flour, improvement in, by Elisha S. Snyder, Charlestown, Va.	May 2, 1846
Windmills, improvement in, by Allen Judd, Cabotsville, Mass.	May 2, 1846
Weather strips for doors, &c., improvement in, by Luther Gifford, Syracuse, N. Y.	May 2, 1846
Ploughs, improvement in, by John M. May, Philadelphia, Pa.	May 2, 1846
Machinery for dressing tortoise shell, &c., improvement in, by Joel R. Morse, Lowell, Mass.	May 2, 1846
Window-sash fasteners, improvement in, by Wm. S. Mc Lean, Allegheny, Pa.	May 2, 1846
Machine for washing gold and silver ores, improvement in, by Daniel Asbury, Coburn's post office, North Carolina,	May 2, 1846
Overshoes, improvement in, by Andrew Vetter, Philadelphia, Pa.	May 2, 1846
Composition for blacking leather, improvement in, by Joseph Hayward, Cleveland, Ohio.	May 9, 1846
Turning Metalic Reeds, improvement in, by J. Shaler Ives, New York,	May 9, 1846
Shovel Ploughs, improvement in, by Moses D. Wells, Morgantown, Va.	May 9, 1846
Bee Hives, improvement in, by Daniel Arndt, West Middletown, Pa.	May 9, 1847
Propelling Vessels, improvement in, by Josephus Echols, Columbus, Ga.	May 9, 1846
Refrigerators for Corpses, improvement in, Robert Frederick and Granville A. Trump, Baltimore, Md.	May 9, 1846
Manufacture of Spoons, improvement in, by Walter W. Hart, Philadelphia, Pa.	May 9, 1846
Dentists' Turnkeys, improvement in, by Hiram Todd, Columbus, Ohio,	May 9, 1846
Meat Cutters, improvement in, by Abishai Clark, Doe Run Post Office, Pa.	May 9, 1846
Bedstead Fastenings, improvement in, by John Haslet and Cornelius Devit, Irville, Muskingum County, Ohio,	May 9, 1846
Manufacture of Harness, Bridles, &c., improvement in, by Samuel Wilson, Danville, New York,	May 9, 1846
Machinery for Dressing Staves, improvement in, by John H. Lester, New London, Connecticut,	May 9, 1846
Safety Switch for Railroads, improvement in, by Philos B. Tyler, New Orleans, La.	May 9, 1846
Smut Machines, improvement in, by J. W. Howlet and F. W. Walker, Greensburg, N. C.	May 9, 1846
Regulating and directing Water upon Water Wheels, improvement in, by J. K. Millard, Town Hall, Pa.	May 9, 1846
Rivetting Weavers' Pickers, improvement in, by Benjamin A. Holbrook, Providence, R. I.	May 9, 1846
Reverberating Furnaces, improvement in, by Andrew Ellicott and John McCrone, Baltimore, Md.	May 16, 1846
Backs of Cooking Ranges, improvement in, by H. H. Stimpson, Boston, Mass.	May 16, 1846
Water Wheels, improvement in, by Christopher Hand, Port Elizabeth, N. J.	May 16, 1846
Spinal Supporters, improvement in, by John L. Sullivan, New York,	May 16, 1846
Sugar Pans, improvement in, by Alfred Stillman, New York,	May 16, 1846

Vol. I. No. 6.

THE MIRROR OF THE PATENT OFFICE,

AND

NATIONAL REPOSITORY OF IMPROVEMENTS

IN THE MECHANIC ARTS, MANUFACTURES, AGRICULTURE AND THE SCIENCES.

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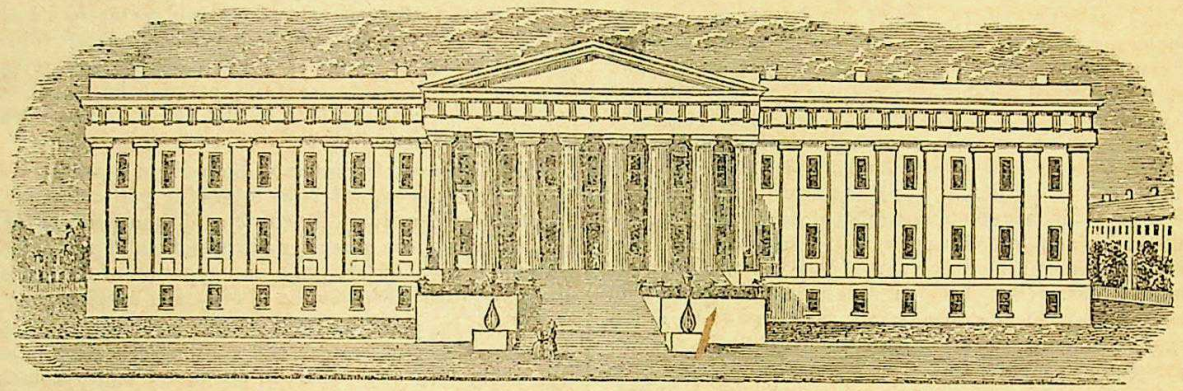


PATENT OFFICE.

CHEMISTRY.

GUN COTTON.

Letters Patent were granted in England, October 8, 1846, *to* CHRISTIAN F. SCHONBEIN, *of Basle, Switzerland, and to his assignee*, W. H. ROBINSON, *in the United States, Dec.* 5, 1846, *for the manufacture of Gun-Cotton, &c.*

THE patentee claims as his discovery, the treating of vegetable fibrous substances, and other organic matter, being of a chemical composition analagous to that of the said vegetable fibrous substances, with a mixture of nitric acid of 1.5 specific gravity, or thereabouts, and sulphuric acid of 1.85 specific gravity, or thereabouts, at the common temperature or a lower one, by which compounds are formed, which, on being heated more or less, ignite suddenly, and produce gaseous matter.

"Of all the vegetable substances known to me, cotton-wool is the most fit material for producing an explosive compound, answering the purposes of gunpowder; and I therefore claim the use of cotton-wool for this purpose, when prepared as herein directed," &c.

As this is a subject which has made no *little noise* and one that may be said to belong to the wonders of the XIXth century, and, like the Magnetic Telegraph, the Letheon, and other astounding discoveries in the arts and sciences, that are revolutionizing the world, we devote a few more pages to it than we design too generally, except it be, like the present, a subject of more than ordinary interest.

There appears to be much diversity of opinion as to the utility or practicability of this invention, and numerous experiments have been tried by able and scientific men on both sides of the Atlantic. And like all *new and valuable* inventions, it has its numerous claimants as to originality. The tenacity often exhibited by claimants to original inventions is really amusing, and brings to mind the anecdote told of the late Dr. Thornton, formerly superintendant of the Patent Office. The doctor was proverbial for never admitting the originality of an invention: except on *one* occasion, when a genuine Yankee applied to him for a patent for making boards of *sawdust*. "This," said the doctor, "is no discovery of your's—I conceived it long ago." "Oh," replied the other, "but my invention goes to manufacturing *oak* boards out of *pine* sawdust!" "That, indeed," exclaimed the doctor, "alters the affair; I am not quite certain that my cogitations went that far." Which of these gentlemen invented the *sawdust pudding* we are not informed.

In the Commissioner's Report for 1846, page 20, will be found the following appropriate remarks in relation to the subject of *Gun-Cotton*, from the pen of Dr. Charles G. Page, long known as an accomplished and experienced examiner in the chemical department of the Patent Office.

"The great degree of public and private interest manifested in this matter," says the examiner, "the numerous publications from various quarters, asserting for different individuals priority and originality of invention or discovery, seem to make it necessary that a full statement of facts in possession of the office be given in relation to this new product.

"It may be premised here, that patents are granted for new and useful inventions or discoveries; and that, as a general rule of patent law, the *mere* applications of discoveries or inventions are not patentable subjects. But when such applications involve invention or discovery, patents may be granted. It does

not appear that Prof. Schonbein, of Basle, was the discoverer of the fact that certain organic substances formed singular and explosive compounds with nitric acid, nor the first to suggest the use of such compounds as substitutes for gunpowder in fire-arms.*

"In the *Comptes Rendus* for 15th October, 1838, we have an account of some experiments by Pelouze, of which the following is a summary: He commences by stating, that Braconnot, many years before, had discovered a new compound of starch with nitric acid, to which he gave the name of xyloidine; that the peculiar properties of this substance had not been investigated, or excited the attention which they merited. Xyloidine was produced by dissolving starch in nitric acid of specific gravity 1.5, and then precipitated by the addition of water. The starch, he considered, acted as a base to the nitric acid, forming the compound xyloidine, which was found to be very combustible, burning with great vividness at the temperature of 180° centigrade. He further found, that by treating paper, linen, and cotton cloth with the concentrated acid for two or three minutes, they became stiff, or like parchment, and when well washed became very combustible, from the presence of xyloidine. M. Pelouze remarks, that the 'combustibility (or explosive character, we may call it) of xyloidine led him to some experiments which he believed susceptible of certain applications, particularly in fire-arms.' His precise language is given in a note below, that it may not be mistaken,† and particularly to compare it with his recent statement made to the meeting of the French Academy of Science on the 2d November last. (See London Mechanics' Magazine for November, 1846.) M. Pelouze states as follows: 'I ascertained—and this I think is a very important result in the history of the application of xyloidine—that instead of dissolving the cellulose substances, it might be obtained with infinitely greater facility and economy by simply impregnating with concentrated nitric acid, paper, cotton and hemp; and these organic matters, thus treated, took fire at 180° centigrade, and burnt almost without residuum, and with excessive energy; but I think it right to add, that I never for an instant had an idea of their use as a substitute for gunpowder—the merit of this application belongs entirely to M. Schonbein.'

"Comparing this avowal of Pelouze with his communication in the Comptes Rendus, it must be inferred that it was only the xyloidine, as obtained from starch, that he contemplated applying to purposes of ordnance. It further appears that, although he operated upon linen and cotton in the form of cloth and paper, he had never tried cotton-wool. Had the question been asked, at the time of Pelouze's experiment, 'Would the result be the same with cotton-wool?' the reply would doubtless have been in the affirmative, as the principle applied to organic matters generally. But had Pelouze happened to have tried *cotton-wool*, it is most likely he would have seen a result pointing him very plainly to something of practical value. Cotton-wool, of all known organic substances, seems to be the best calculated for the production of this curious compound, and it is the use of this substance that M. Schonbein claims. But he further claims a process which, apart from the result, is highly interesting. When the organic matters are to be treated in nitric acid it must be of a high degree of concentration, viz: specific gravity, 1.5, which is very difficult to obtain in commerce. If the acid be weaker, these matters are dissolved, forming oxalic acid, carbonic acid, and other compounds. By mixing sulphuric with the nitric acid, the sulphuric seizes upon the basic water of the nitric acid, and thus presents nitric acid to the cotton and other organic substances in the state of highest concentration. The concentrated sulphuric acid, alone, would destroy these substances, but it appears to exert no action upon them when mixed with the nitric acid. M. Schonbein, therefore, claims the treatment of organic substances generally by such mixture. There are several modes in which the nitric acid may be presented to the cotton, but in all such cases the result seems to be uncertain, and generally a compound of inferior practical value to the material produced by Schonbein's process. In a private letter from Professor Hare, recently received, he states, 'that the compound had been formed by the action of the vapor of nitric acid upon the cotton.'

"The claims of Professor Schonbein, upon which letters patent were issued, cover the following particulars: 'The use of *cotton-wool* prepared by nitric acid, the process for treating organic substances generally, in which sulphuric acid is mixed with the nitric, and lastly the impregnation of the substances as *above prepared* with solution of nitrate of potassa.'

"Upon the practical value of this invention the public must decide. Every laboratory and apothecary's shop in the country, every tyro and expert in chemistry and pyrotechny, will testify to the interest it has excited.

"I have examined the products of Schonbein's process with reference to certain particulars, and find that the gun-cotton explodes upon heated mercury at various temperatures, from 370° Fahrenheit to 400°, according to certain variations in the preparation; that it is a non-conductor of electricity, and does not explode with the electric spark like fulminating compounds; that it does not absorb moisture so readily as unprepared cotton, and requires more time under similar circumstances to deprive it of hygrometric moisture; that the discharge of a Leyden jar explodes it, but, like gunpowder, it can rarely be exploded without interposing in the line of discharge a wet thread or some other medium of resistance, such as a body of water or a long wire; that when enclosed in small quantities in tubes of paper or metal, it does not communicate ignition or explosion, owing to the low heat produced; that immersion in water at 200° Fahrenheit for 12 hours did not materially affect its combustibility; that when slightly impregnated with saltpetre, and thoroughly dried, it might be closely rammed in a pistol, which it could not be otherwise, and that its power under these last conditions, as far as could be inferred from perforation, was three times that of gunpowder; and finally, that it cannot be ranked among detonating compounds. The following notice from Brande's Manual of Chemistry bears closely upon this subject: '*Artificial Bitter.*—By digesting indigo, silk, and a few other substances, both of vegetable and animal origin, in nitric acid, an intensely bitter matter is formed, called by Welther the *yellow bitter principle.*—(Ann. de Ch., xxix.) Chevreul has rendered it probable that this is a compound of a peculiar product with nitric acid. It is crystallizable, burns like gunpowder, and detonates when struck with a hammer.'

"The commonly received opinion that the gun-cotton would be liable to spontaneous combustion has no foundation whatever in chemical philosophy; and I may add here, that one advantage is claimed for the gun-cotton over gunpowder—that its explosion is unattended with smoke, the combustion being

* Since the preparation of this article, Prof. Schonbein has published a letter in a recent number of the "London Philosophical Magazine," vindicating his entire right to the discovery of these explosive qualities, which we shall insert in our next number. Ed.

† "J'ai déjà dit que la xyloidine résulte de la combination de l'amidon avec les éléments de l'acide nitrique, c'est en quelque sorte un sel dans lequel l'amidon remplit relativement à l'acide nitrique, le rôle de base: aussi est elle très combustible; à une temperature de 180° centigrades, elle prend feu, brûle presque sans résidue et avec boaucoup de vivacité. Cette propriété m'a conduit à une expérience que je crois susceptible de quelques applications, particulièrement dans l'artillerie. En plongeant du papier dans de l'acide nitrique à 1.5 de densité l'y laissant le temps nécessaire pour qu'il en soit pénétré, ce qui a lieu en général au bout de deux ou trois minutes, l'en retirant pour le laver à grande eau, on obtient une espèce de parchemin impermeable a l'humidité et d'une extrême combustibilité. La même chose arrive avec des tissus de toile et de coton. Le papier ou les tissus qui ont ainsi subi l'action de l'acide nitrique, doirent leur propriétés nouvelles à la xyloidine qui les recouvre."—*Comptes Rendus pour Octobre*, 1838.

nearly perfect. Its uses for blasting have been fully tested, and it has already been extensively adopted for that purpose. The following extract from a letter addressed to the editor of the Lowell Courier, by S. L. Dana, Esq., will give some idea of its value in this particular:

"These trials were made at the powder works of C. M. Whipple, Esq.; with his aid and that of Mr. T. B. Lawson, the well known artist of this city, the following experiments were made on November 30, 1846: The eprouvette, or proof mortar, carries a ball of 24 pounds of iron. Its elevation, 45°. Its chamber holds one ounce of gunpowder and about half an ounce of gun-cotton, when that is rammed hard. Two 24-pound balls were used. No. 1 has 1-16th, and No. 2 1-8th inch windage. The last, in powder trials, falls always a few yards short of No. 1. It was found by trial, as will appear below, that the projectile force depended much on the mode of charging. The best effects were obtained by loosely filling the chamber with gun-cotton, leaving the greater portion as a bed, at the breech of the mortar, on which the ball rested. Four qualities of gun cotton were used: No. 1, 25 minutes' dip in the mixed nitric and sulphuric acid; No. 2 is No. 1 dipped, after drying, 25 minutes in fresh acid; No. 3, dip 25 minutes, and then a new portion of mixed acids added, and the dip continued 25 minutes; No. 4, blasting cotton, dip 35 minutes in the acid. The particulars of the preparation need not be stated. Two discharges with Mr. Whipple's best rifle powder, FFFF, were first made. The charge was one ounce for each. No. 1 threw the ball 288 yards; No. 2 threw the ball 272 yards: average, 281½ yards.

"My next trials were in blasting a ledge of argillo-mica slate. The first trial was in the toughest and hardest portion of the ledge: the stratification imperfect, and nearly vertical. The rock presented a perpendicular face 9 feet high. Five and a half feet from the face a hole was drilled; and at the distance of 12 feet from this, and 6 feet from the face of the rock, a second hole was drilled. These holes were 1 1-2 inch in diameter, and about 9 feet deep. The gun-cotton was quality No. 4 in the preceding mortar trials. It was enclosed in cartridges of cotton cloth, 1½ inch diameter, and respectively 2 feet 10 inches and 5 feet long; holding 9 and 11 ounces gun-cotton. A little dry sand was put in the bottom of each hole, then the cartridge let down by its attached fuse, and covered with a tamping of dry sand, 5 feet over the one and 6 feet over the other.

"The fuses being lighted, the explosions occurred; one within a few seconds of the other. The report was sharp, but not loud, and very little smoke. This chiefly blew out at the fissure made by the explosion at the bottom of the rock, and some appeared at the top, over the mouth of the drilled holes. It appeared to Mr. Worthen, who was in a position to see it, as *dust*. This will be referred to again. On examination, the result was perfectly satisfactory to the contractors and the engineers, Messrs. Francis & Worthen, who then measured the mass of rock moved. Its dimensions were, in feet, 25x5x9=1,125 cubic feet. The rock weighs a ton to 12 cubic feet. We have at least 90 tons moved by 20 ounces of gun cotton. The contractors stated that they should have used 10 or 12 pounds of powder to have made a similar fissure for their intended seam blast. The effect, then, is as 1 to 8. A second trial was made by the same parties on December 4th, in the same ledge, at a place where the rock is more slaty, and more distinctly stratified, with a northerly dip of about 95°.

"The rock is here softer and *shivery*, and showed a perpendicular face of about 20 feet. The hole was 5 inches diameter, 9½ feet deep. 4lbs. 14oz. 6dr., or 78dr. 6oz gun-cotton, No. 4, were enclosed in a "vulcanized" India-rubber cloth case, 5 inches diameter, and 3 feet long. It was let down, as before, by its fuse, and covered with 6 feet of dry sand. The explosion took place with a very little report, not louder than a musket shot. The mass moved was, in feet, 45x10x9½=about 350 tons.

"The seams were wider and more numerous than at the first blast. Besides the main fissure, running parallel with the face of the rock, there were others diverging from the hole diagonally, from 15 to 20 feet long. The effect for a following seam blast was a little too great, for it required 100 pounds of powder to fill the crevice. The blaster employed by Messrs. Boody, Ross & Co., said he should have used about 20 pounds of powder to have effected the object he wished. We here moved a mass proportioned to the increased quantity of gun-cotton, for 20:90::75:350; but the actual result was, a greater distance moved, and more breaking up of the mass. I was in a position to watch the *smoke*, if so it may be called. It consisted of watery vapor, and of orange-yellow nitrous acid vapor. The deutoxide of nitrogen, as it escaped from the hole, seized on the oxygen of the air, and was changed to orange-yellow vapor. There was a faint smell of nitrous acid about the rock. Pieces of the India-rubber cloth were found near the hole, thrown off, but unburnt. It was, I presume, this yellow nitrous vapor which appeared as *dust* in the first explosion. The smoke lasted about one minute.

"The gun-cotton used in these trials was perfectly dry, and *well carded* after its preparation. It was made from cotton carded by a machine, and was prepared by myself, by the principle of the process discovered by Mr. A. A. Hayes, of the Roxbury laboratory.

"In a slight notice in your paper, a few days ago, of some successful trials made in Lowell with gun cotton, you have inadvertently awarded to myself the honor of the discovery of the mode of its formation. I cannot claim this desirable distinction. This belongs exclusively to Mr. Hayes, who was the first in Boston, or its vicinity, not only to discover, but, with that courtesy so often united to true science, the first to publish his results. He immediately informed me of his success by a letter dated Thursday morning, Nov. 19th, which I received the next day at noon. It enclosed samples of his gun-cotton, which, with his letter, were forthwith shown to several persons here. In the evening of the 19th November, Mr. Hayes' gun-cotton and processes were exhibited by his friend Teschemacher at a meeting in Boston of several gentlemen devoted to science, or interested in all that pertains to its application. It was at this meeting that the first gun-cotton, prepared either in Boston or its vicinity, was exhibited, and its mode of preparation detailed in a written communication. Minutes were copied from this by at least one person present. The day following there appeared in an evening paper, in Boston, accounts of success in forming *explosive* cotton; but there was no allusion to the light by whose borrowed rays had been obtained even partial success. Had the process of Mr. Hayes been followed as implicitly as it had been freely disclosed, the preparation would have equalled that which had already been exploded in several public places in Boston on Friday morning, November 20th, and which was prepared by Mr. Hayes. On Saturday, the 21st ultimo, appeared a letter from Mr. H. in the Boston Daily Advertiser, which, with plentiful samples of gun cotton, had been sent to its editor on the preceding Thursday, several hours before the assembling of the meeting to which I have referred.

"The preparation of *explosive* and of *gun* cotton has been discovered by several persons in Europe and in America, since Schonbein first made the world acquainted with this singularly wonderful compound. These all may be rediscoveries of his mode, for of that we as yet know nothing; but they are not the less original, nor less honorable, nor less dear to the scientific character of their authors. I am happy to embrace this opportunity to state the true claims of my friend Hayes.

"I have had other trials made with gun cotton by experienced riflemen. They show that its power is from four to eight times that of the best rifle powder. These experiments are as yet unfinished, and will form the subject of a future communication."

In the London, Edinburgh, and Dublin Philosophical Magazine for June, 1847, we find the following interesting paper for the *Analyzing of Bodies containing Nitric Acid, and its application to Explosive Cotton.* Read before the Philosophical Society of Glasgow, April 14, 1847, to which body it was communicated by the author, Mr. WALTER CRUM, F. R. S.

"I shall first," says the experimenter, "give an account of its application to *nitrate of potash*—a body of known composition, and easily obtained in a state of purity—to which I had recourse as a means of proving the accuracy of the method, and detecting any fallacy to which it might be liable. The salt I employed was purified by repeated crystallization, and fused at little more than its melting heat. A glass jar eight inches long and an inch and a quarter in diameter, is filled with, and inverted over mercury. A single lump of the fused nitrate, weighing about six grains, is let up into it, and afterwards fifty grains of water. As soon as the nitrate is dissolved, 125 grains of sulphuric acid, ascertained to be free from nitric acid, are added. By the action of the mercury upon the liberated nitric acid, deutoxide of nitrogen soon begins to be evolved, and usually in about two hours, without application of heat, the whole of the nitric acid is converted into that gas. Occasional agitation is necessary, and it is easily performed by giving a jerking horizontal motion to the upper part of the jar. The surface of the sulphuric acid is then marked, and three-fourths of a cubic inch of solution of sulphate of iron, recently boiled, let up into the jar. The gas is rapidly absorbed, except a small portion at last, which must be left several hours to the action of the solution, or be well agitated in a smaller tube with a fresh portion of it. No correction of the nitric oxide has to be made for moisture; for the mixture of acid and water which I employ

ed, as I ascertained by direct experiment, has no perceptible force of vapor. In one experiment--

5.40 grains of potash yielded

4.975 cubic inches of gas, at 60° Fahr., and var. 30 in. The residue not absorbable by sulphate of iron, was

0.015 cubic inch ; leaving

4.96 cubic inches of nitric oxide = 1.594 grains, NO_2, and which correspond to 2.869 grs. nitric acid, or 53.13 per cent. of the nitrate of potash.

" Four consecutive experiments made in this manner yielded--

53.13
53.14
53.73
53.29

Mean 53.32

or leaving out the third experiment, 53.19.

" The calculated per-centage of nitric acid in nitrate of potash, the acid being represented by 6.75, and the potash by 5.89,92, is 53.36.

" In order further to determine whether the presence of organic matter would interfere with the liberation of the nitric oxide, the experiment was repeated with the addition of three grains of cotton wool, which was first dissolved in the sulphuric acid ; the result was 53.24.

" Other nitrates are analyzed in the same manner. For salts in powder, which it is difficult to pass through mercury without loss, I cut a quarter-inch glass tube into little cylinders for them, of half an inch long, and close up the ends with thin paper fastened with gum. In the analysis of numerous samples of crude nitrates, the residue which is azote, may be taken as a constant quantity, and the jar graduated in such a manner that the volume of gas may be read off at once as the per-centage of nitric acid.

" *Preparation of Gun Cotton.*—The cotton I employed was fine Sea Island. It was first thoroughly carded, and then bleached, by boiling in caustic soda, and steeping in solution of bleaching powder ; then caustic soda again, and afterwards weak nitric acid. It was well washed and beaten in a bag with water after each operation. When burnt, 10,000 parts left 9 of ashes. It was considered to be lignine, nearly pure.

" The cotton, dried and carded after bleaching, was exposed in parcels of 10 grains each, for several hours, to the heat of a steam bath, and each parcel was immersed, while hot, in an ounce measure of the following mixture :

" One measure sulphuric acid, spec. grav. 1.840. Three measures of pale lemon-colored nitric acid, of 1.517. After one hour it was washed in successive portions of water, till no trace of acid remained, and dried in the open air.

30 grs. of bleached cotton wool, dried at 65° F., became, after being some hours in a steam bath,

28.32 grs., and lost, therefore, 5.6 per cent. of water. It increased to

51.08 grs., when made into gun-cotton, and dried in the open air.

Dried further *in vacuo*, over sulphuric acid, it was reduced to

50.40 grs., and lost, therefore, 1.33 per cent. of water.

100 of dry cotton produced 177.9 of dry cotton.

" The gun-cotton thus prepared is whiter, but less transparent, than the original bleached wool. It appears to be little liable to change, but a slight elevation of temperature causes a commencement of decomposition, and the color becomes more or less brown. It is much less tenacious than cotton wool. Dissolved in nitric acid, and tested with chloride of varium, it gives no indication of sulphuric acid.

" The increase of weight above stated is the greatest I have been able to obtain ; and I had completed its analysis in the manner I shall describe, when I found reason to believe that it still contained a portion of unaltered cotton. With a view to saturate that portion, it was immersed a second time, and for twenty-four hours, in the same mixture of acids, but without yielding any greater quantity of nitric acid.

" An immersion of one hour in nitric acid alone gave a better result. It lost in weight by this second process 0.47 per cent. It was little altered in appearance, but after being dried in the open air, it lost in the air-pump only 0.69 per cent., instead of 1.33, as in the former case. It is this substance of which I shall now relate the analysis.

" *Ashes in Gun Cotton.*— Sixteen grains of gun cotton were dissolved in nitric acid. The solution being evaporated by degrees, and burnt to ashes, left 0.035 gr. of a reddish ash, or 0.22 per cent.

" *Nitric Acid in Gun-Cotton.*—In this process the same apparatus is employed as for nitrate of potash. About 6 grains of the gun-cotton, containing a known quantity of water, is collected into a ball—squeezed between the finger and thumb to free it as much as possible from air—and let up into the jar, over the mercurial trough. 125 grains of sulphuric acid are added to it. Nitric acid is liberated, and, being acted upon by the mercury, produces nitric oxide. After one hour, when about three fourths of the whole gas has been evolved, and the gun-cotton is entirely dissolved, 50 grains of water are added. In another hour the increase of gas ceases ; in a few hours more its boundary is noted, then treated with sulphate of iron, and the residue measured. It consists of azote from the common air introduced with gun-cotton, and a minute portion also, which is always accidentally entangled between the mercury and the glass. Its oxygen is absorbed by the mercury, when in the state of nitrous acid.

" In one experiment—

6.02 grs. of gun-cotton = 5.978, after being dried over sulphuric acid *in vacuo*, and=

5.964 grs., after deducting ashes, produced

5.513 cubic inches of gas, bar. 30 in., therm. 60°, of which 0.08 was left sulphate of iron.

5.433 cubic inches, therefore, were deutoxide of nitrogen,=

1.746 grs. NO_2, which represent

3.143 grs. of nitric acid, or 52.70 per cent.

Another experiment gave 52.68 per cent.

The gun-cotton prepared by a single immersion gave only 51.42 per cent. of nitric acid.

" *Carbon in Gun-Cotton.*— Having failed to obtain good results by burning this substance with oxide of copper, I used chromate of lead, precipitated from the nitrate, and heated to redness. I employed for the combustion an apparatus which I used many years ago for the analysis of indigo, and I still find it very convenient for substances

which do not require a strong red heat. It consists of a tube of hard glass, eight inches long and three-eighths of an inch in diameter, the gases from which are led by a small bent tube under the receiver in a mercurial trough.

1 inch at the closed end of the tube is filled with 8 grains chlorite of potash, ground with chromate of lead.

4½ inches are filled with chromate of lead, among which is ground to powder 3 grains of the gun-cotton.

1½ inch contains chromate of lead that has been used to wash out the mortar.

"A glass plug separates these materials from the perforated cork which joins the two tubes. The materials are gradually heated with broad-wicked spirit-lamps. Carbonic acid comes over, mixed, when in the receiver, with nitric oxide and the azote of the apparatus; and when all the gun-cotton is consumed, the lamps are extended to the chlorate of potash. The oxygen gas thus liberated, which in other cases is useful to consume carbonaceous matter that may have escaped the chromate, expels in this case all remains of carbonic acid, and passing itself into the receiver, mixes there with the nitric oxide, and causes its entire absorption by the mercury. Oxygen and azote are then the only gases left along with the carbonate acid, and as these are not absorbable, an addition of half a cubic inch of solution of caustic soda indicates exactly the quantity of carbonic acid present.

"In one experiment, 2.993 grs. of gun-cotton (after deducting water and ashes) yielding 7,952 cubic inches of gas, of which 5,733 was carbonic acid,= 0.739 grs. carbon, or

24.69 per cent.

A second experiment gave 25.16 "

Mean .... 24.92 "

"*Elements of Water in Gun-Cotton.*—To burn gun-cotton for the purpose of collecting its oxygen and hydrogen in the state of water, I ground up 10 grains of it with pounded flint, and used the combustion tube already described, having attached to it a chloride of calcium tube, and afterwards a tube with asbestos moistened with sulphuric acid. But along with water, ammonia and other matters were obtained, which destroyed the result. I next used a thin glass tube of a foot and a half long, bent so that a foot in the middle of it could dip into cold water. Such water as would condense at 65° Fahr. was collected. The gas was led through it into a mercurial trough, and measured. A trace of cyanogen appeared in the last portions of gas, while the oxygen from the chlorate of potash was burning a quantity of charcoal that had escaped the nitric acid.

"After the experiment, the refrigerating tube was found studded with large crystals of bicarbonate of ammonia. It contained very little water in the liquid state. The crystals and the liquid were washed out with more water, converted into muriate of ammonia, and found to contain 0.675 gr. NH_3 $2\,CO_2$, the hydrogen of which represents 0.299 gr. of water. There were besides

2.025 grs. water in the tube. In the 22 inches of gas which were obtained, assuming it to be saturated with moisture, which is doubtful, there was

0.088 gr. of water—making in all

2.412, from which must be deducted

0.160 gr. hygromeric water in the gun-cotton and in the flint, leaving

2,252 for the water in 9.92 grs. of dry cotton, or 22.70 per cent.

"In a second experiment, where the only difference was in having moistened cotton for the gas to pass through before entering the mercurial trough, the water obtained only amounting to 20.61 per cent. I did not proceed further. These were the two last of a number of experiments, and the determinations of nitric acid and carbon are so much more satisfactory, that I prefer resting the water contents upon their results.

"Purified cotton wool (lignine) is composed of C_{12} H_{10} O_{10}. During its transformation into gun-cotton, there is no indication of change in the proportion of its oxygen and hydrogen. The difference, therefore, between the weight of the substance employed and that of the nitric acid and carbon found by experiment, is oxygen and hydrogen in the proportions which form water.

"The experiments I have related give the following for the composition of gun-cotton :

52.69 nitric acid,
24.92 carbon, and leave
22.39 for the elements of water.

100.00

These numbers are nearly in the proportion of 12 C, 7 HO, 3 NO_5.

Found.	Calculated.
52.69	52.69 = 3 NO_5.
24.92	23.41 = 12 C.
22.39	20.49 = 7 HO.
100.00	96.59

Leaving a remainder of 3.41 per cent., consisting of 1.51 carbon, and 1.90 water. These, however, are nearly the proportions which form lignine.

Found.	Calculated.	
1.51	1.51=12 C	} =lignine.
1.90	1.88=10 HO	}

"Gun-cotton, from the form in which it is produced, is not one of those substances we can expect to obtain in absolute purity. Every previous improvement in its preparation had diminished this excess of unaltered cotton, and I had no reason to suppose the last portion perfect; considering the difficulty with which some of the previous stages of improvement had been attained.

"The specimen I have thus examined consists, therefore, of—

96.59 gun-cotton (12 C, 7 H, 7 O, 3 NO_5).
3.41 lignine (12 C, 10 H, 10 O).

100.00

And pure gun-cotton consists of—

24.24=12 C.	24.24=12 C.
21.21= 7 HO.	2.36= 7 H.
54.55= 3 NO .	14.14= 3 N.
	59.26=22 O.
100.00	100.00

It is lignine in which three atoms of water are replaced by three atoms of nitric acid.

From the same number of this Magazine, p. 409, we also find some experiments made by R. Porrett, Esq., which we here introduce, on the existence of a *New Vegeto-Alkali in Gun-Cotton.*

"After several trials," says Mr. Porrett, "I suc-

ceeded by the following process: I took 2 ounces by measure of nitric acid of the specific gravity 1.45, to which I added 50 grains of gun-cotton; the mixture being gradually heated to 100° Fahrenheit's scale, and kept below 180°, became quite transparent and fluid, and all the cotton disappeared, being quietly dissolved without any evolution of gas; when a portion of the solution in this state was dropped into water a white precipitate was formed, having all the properties, structure excepted, of the original gun-cotton, the liquid was therefore a simple solution in acid, without decomposition; but on heating the liquid further up to 240°, deep red acid vapours were given off abundantly for a long time, and these collected in a receiver surrounded with ice proved to be hyponitrous acid. The same effect exactly took place when sulphuric acid was used instead of nitric at the same temperance, so that the hyponitrous acid was merely eliminated in both cases, and not formed from the excess of nitric acid used in the former instance; the cold and very concentrated nitric solution containing a great excess of acid was now brought nearly, but not quite, towards a neutral state by pouring into it a strong solution of sub-carbonate of potash, after which a solution of bicarbonate of potash was used until perfect neutrality was obtained; the liquid in this state became thickened, not only by the quantity of minute crystals of nitrate of potash formed in it beyond what it could hold in solution, but also by an abundant precipitate of a whitish-gray color, consisting of the new alkali probably in a state of carbonate. The liquid was heated nearly to ebullition, during which its color became darker, and it was set aside in order that the crystals of nitrate of potash formed on cooling might be separated, and the liquid disembarrassed of them as much as possible; after this it was evaporated to dryness by the heat of a water-bath, and the brownish residue was acted upon first by sulphuric æther, which, however, would not dissolve any portion of it; next by alcohol, specific gravity 0.813, which took up a very small quantity of the new alkali; then spirit of wine was tried; the solvent power was greater than that of the alcohol, but it had the advantage of taking up with the alkaline matter a very minute quantity of the nitrate of potash which accompanied it, so that I could not get an exclusive solvent for the former; the principal quantity by far of the carbonated alkaline oxide of lignine still remained, and I was obliged to use a small quantity of cold, distilled water for its solution, notwithstanding that the water took up at the same time some of the nitrate of potash and bicarminate of potash remaining in the mass. This aqueous solution contains the new alkali in abundance, but mixed as stated with the other two salts, it acts very powerfully upon rendened litmus paper.

"When a portion of the hyponitrous acid is neutralized by an aqueous solution of the new alkali, hyponitrite of oxide of lignine, probably identical with gun-cotton or with xyloidine, is reproduced and precipitated as an insoluble compound.

"Thus I have verified the accuracy of my suggestions, excepting that, instead of nitrous acid neutralized by a new alkali existing in gun-cotton, it is the hyponitrous acid so neutralized that constitutes that substance. For this new alkali I have proposed the name *Ligniæ*, and believe that it opens a wide field for scientific research.

"I suspect that in the natural decay of woody fibre from leaves and rotting plants, this alkali is produced in combination with acetic acid, and that the acetate of ligniæ so formed exists in the sap of all vegetables; further, that it is decomposed and deoxidated by light acting on the leaves and bark of trees, reproducing lignine for the assimilation and growth of the plant: its action also on the animal system deserves inquiry. I lay no stress, however, on these speculations, excepting so far as they may stimulate others to enter into investigations which it is impossible for me to continue, and therefore leave the subject without reserve to those who have more leisure.

"I would remark, that the composition of ligniæ must be that of lignine plus 2 atoms of oxygen given up by the nitric acid in becoming hyponitrous acid; and I would further observe, that the latter acid and ligniæ forming an insoluble compound, may probably be employed as mutual tests of each other's presence in combinations."

EPITOME
OF THE COMMISSIONERS' REPORTS.

CIVIL ENGINEERING.

(Continued from page 122.)

LIGHT-HOUSES.

The great amount of surface which light-houses present to the action of the waves, together with the difficulty of finding a bed suitable for a solid foundation where such structures are required, induced the British Government to test the plan of building them of iron, on iron piles; placing the house above the reach of the waves, and, therefore, presenting only the small surface of the piles to their action. The experiment has been fully successful.

The construction of these light-houses was very much facilitated by an improvement patented in England several years ago, the value of which has but recently been appreciated: and although it has slumbered unnoticed for many years, it is now deemed so valuable, that the proprietor obtained letters patent in this country in the year 1844 for the remaining portion of the 14 years from the date of the letters patent granted in England.

This invention is called the *Screw Mooring*, and was constructed chiefly for the purpose of mooring a floating dry dock, invented and patented in England in the year 1832; and is applicable to piles as well as mooring-chains, by attaching it to the lower end of the pile, or that part which is to be inserted in the ground, or bed of a river, &c.

A description of this invention may be found in the "Civil Engineer and Architects' Journal," from which the following is taken, viz:

"This sort of mooring is constructed, as its name implies, on the principle of the screw, but differing essentially in form from that well known instrument; for, while the spiral thread makes little more than one turn round its shaft, it is, at the same time, extended to a very broad flanch; the hold which it takes of the ground being proportional with its breadth of disk.

"When it is necessary to provide against a heavy strain, Mr. Mitchell has moorings of 3 feet 6 inches diameter; and the principle is capable of still further extension.

"A mooring of the above diameter presents a resisting surface equal to about 10 square feet, whereas the palm of the largest anchor in the British navy does not exceed half the size; and some estimate of its holding powers may be formed,

when it is shown that this broad surface can be screwed to a depth many times greater than that to which the palm of an anchor can ever descend.

"The method of laying down the mooring is briefly thus: A strong mooring chain being so attached to it as to allow the screw to turn freely without carrying the chain around with it, a powerful iron shaft is then fixed firmly in the upper part of the mooring, (which is formed square for that purpose,) setting in the same manner as a key to a harp or piano forte in winding up; it is then lowered by the mooring chain, joint after joint being added to the shaft, till the mooring has reached the ground; light levers, of 12 feet in length, are then applied to the shaft, in the manner of a capstan, when the operation of screwing the mooring into the ground commences.

"Two boats, or barges, having been moored firmly, head and stern, close alongside each other, and the upright shaft rising between them, about midships, the men place themselves at the bars, and move round from one boat to the other; the two giving them a safe and convenient platform. By a simple contrivance, the levers are occasionally shipped upwards as the screw and shaft sink into the ground.

"When the number of men employed can no longer force the screw round, the levers are removed, and the shaft drawn out of the ground, leaving the mooring firmly inbedded, with the chain attached to it; a buoy being shackled to the other end of the chain, the work is completed; the time required for the whole operation seldom exceeding a few hours."—*Ellsworth's Report for* 1844, *page* 482.

SAWS FOR CUTTING OFF PILES UNDER WATER.

Saws have long since been combined with a boat or scow for the purpose of cutting off piles under water; but this operation has always been accompanied with a serious difficulty, viz: the motion of the scow occasioned by the swell or waves in harbors. To avoid this difficulty, the saw is now combined with the scow, by means of a sliding frame, balanced in the sliding cheeks by a counter-weight, so that the rise and fall of the boat by the swell does not seriously affect the operations of the saw. This device has been reduced to practice in Boston harbor.

In England, the common pile driver has been modified by attaching the ram directly to the end of the piston rod of a vertical steam engine placed above it, or with a horizontal engine, by means of a rope or chain passing over and under two pulleys, so as to dispense with the monkey, and thereby increase the velocity of the action of the ram.
Ellsworth's Report for 1844, *page* 496.

CANALS.

A Patent was granted during the year 1844 for an arrangement adapted to the support of canal lock-gates from above, instead of having them run on a plate at the bottom, by means of a stirrup extending from the outer edge of the gate to a post so inclined as to bring its upper end just over the axis of the gate-hinges; the part being sustained by log-chains, and the stirrup provided with a swivel-screw for adjustment. There is connected with this, an arrangement of cords and windlass for opening and closing the gate from the side opposite to that on which the gate is hung.

There appears to have been nothing offered to the Patent Office upon this subject, during the year 1845.

BRIDGES.

Very few improvements have been made for some years past in this branch of civil engineering. But one patent was granted in 1844, which consisted in a modification of one of the modes of cambering the truss-frames. Heretofore this has been effected, in some bridges, by tension rods extending from the foot of one post to the top of the next, inclining in opposite directions from the middle of the bridge towards each end; the rods being provided with screw-nuts. And the modification consists in the addition of another set of tension-rods crossing the first set, by means of which the inventor alleges that he can more effectually camber any part of the truss than by the single set of rods, as previously used.—*Ellsworth's Report for* 1844 *page* 500.

Two patents were granted during the year 1845, one for a slight modification in the mode of producing the camber of the truss, viz: by the distension wedges, or apparatus, applied between the ends of the bars of the upper stringer, or chord, in combination with the contractile and cambering chain, made and applied to the lower or other suitable part of the truss, &c.

A patent was also granted for the arrangements of a series of braces upon the *outer sides of the truss*, and so that they shall extend above and below the cords of the same, and be confined to the truss, &c.

LAND CONVEYANCE.

AXLE-TREES.

Several patents were granted during the year 1844 under this head, viz:

For a mode to connect the front axle-tree with the body, by a modification of what is sometimes called the "fifth wheel," which consists of a horizontal circular plate attached to the upper surface of the axle-tree, in the form of a cross, the outer ends of two of its arms being so formed as to embrace the rim of the wheel, to aid the king-bolt in forming the connexion; and the other two arms, which rest on, and are bolted to the axle-tree, being bent down, that the axle-tree may rock to a certain extent before these arms come in contact with the under face of the wheel.

For a mode of connecting and bracing elliptical springs on the front and back axle-trees, by means of two semi-elliptick springs, jointed to the two sets of springs, and connected together by stirrup and a swivel-screw, to regulate the tension of the connecting and bracing springs:

For an improvement in spring perches; and for a modification of the well-known mode of forming the connexion between the body and the running-gear by means of lever jointed to the body, the springs being attached to the body instead of the frame.

HUBS.

Several patents were also granted during the same year for minor improvements in the boxes of carriage-hubs; in the manner of connecting the hub with the rim, by so forming the spokes as to embrace the hub, instead of being inserted in it.

For methods of detaching the horses from carriages, by liberating the connexion between the traces and the swingle-tree.—*Ellsworth's Report for* 1844, *page* 501-2.

Seven or eight patents were granted in 1845 for improvements in wheels, in the hanging of carriage bodies, in axles and in brakes, all of which are slight modifications, of devices long and well known.

The most striking improvement patented under this head during the year 1845, is the *Prairie Car*, an illustrated and full description of which will be found by referring to No. 2 of the Mirror, page 22.

MILL MACHINERY, &c.

GRINDING MILLS.

The patents granted under this head in 1844 were not very numerous, but exhibited some features of novelty.

Under one of these patents it is proposed to have a dead spindle pass up through the bed-stone, with a countersink in its upper end to receive a point projecting from the upper part of a "chuck," which is grooved out around the point, to receive the rim on the end of the dead spindle formed by the countersink. The under side of the bale, which is attached to the eye of the runner, has also a point which rests, in a countersink in the upper surface of the chuck, to balance the runner; and the upper part of this bale is adapted to receive the spindle.

Patents were also granted for *dressing the stones*, in one of which about one-half the surface of the bed-stone, from the periphery inward, is smooth, with the exception of a radial groove, to act as a spout for the discharge of the flour; that part of the face of the runner corresponding with this being provided with lands, about eight in number, and inclined the reverse of those on the other portions of the face. Under another patent it is proposed to dress the stones in curved lines, instead of straight; and to make the eye of the runner conical; and to connect the bridge-tree (on which the runner rests) and the mouth of the hopper with a centrifugal governor; so that when the velocity of the runner is increased beyond a certain range, the feeding is reduced, and the runner elevated, to reduce the pressure on the grain.

A patent was also granted for setting or regulating the grinding surfaces by rotating the concave about an imaginary centre, eccentric to the axis of the grinding cylinder; by means of which, the whole of the concave is equally separated from the cylinder.—*Ellsworth's Report for* 1844, *page* 502.

GRINDING CORN WITH THE COBS.

Several patents were granted in 1844–5, for improvements in mills for grinding corn with the cobs, by an arrangement of cutters to cut the cobs into slices preparatory to the action of the teeth. These patents are limited, however, to modifications of mills previously patented for cutting and grinding. One of these improvements in 1844 consists in a knife attached to, and moving with the spindle, and four attached to the bed-stone, and projecting within the eye, at equal distances apart and arranged tangentally to a circle smaller than the eye of the millstone; the mill running horizontally. In the other, which runs vertically, the corn and cobs are fed in through a hole in the fixed grinder, about midway between the centre and periphery, which is provided with a bed-cutter; there being two corresponding cutters on the runner, and the faces of both grinders being provided with teeth, to divide the slices formed by the cutters preparatory to the grinding.—*Ellsworth's Report for* 1844, *page* 501–2.

ADJUSTING THE BUSH, OILING, BOLTING, &c.

One patent was also granted for adjusting the bush. "The bush is made in wedge-formed segments, with a rod extending down from each segment, and passing through, and being secured to a plate below, by means of nuts above and below, for the purpose of adjusting each segment separately; and, for the adjustment of the whole together, this plate is suspended, by means of seven rods and nuts, from the box of the bush."

Oiling.—At the bottom of the bush case there are two thick leather washers, which are kept tight around the spindle by means of a large screw nut, through which it passes, and the oil is supplied from a reservoir within the nut.

FLOURING MILLS.

Several patents were granted during the year 1845 for *Flouring Mills;* among them, one for pulverizing the grain in a kind of mortar, having a series of pestles, and regulating the discharge in such a manner that the flour cannot escape until it has become sufficiently fine.—*Burke's Rept. for* 1845, *p.* 75.

BOLTING.

After grinding, the flour passes through a bolting machine, by which it is sifted, and the different qualities separated from each other. At the lower end of the bolt the sifting medium is coarser than at the upper end, the upper end allowing only the finest flour to pass through into the trough below. A portion of the finest flour, however, will adhere to the coarser part, and pass down and be deposited with it, and thus constitute a portion of the inferior article. To save the fine flour thus liable to be lost, an improvement in the bolt was patented in 1845, which consists of diagonal or spiral vanes or scrapers attached to its exterior surface, near the lower end, which, as the bolt revolves, scrape or carry a portion of the "middlings" up along the trough, and deposite it in the tube through which it is conducted to the carriers, and passed a second time through the bolt. This operation is supposed by the inventor more perfectly to effect the desired separation.—*Burke's Rept. for* 1845, *page* 75.

In Bolting flour, it is proved by experience that the flour sometimes adheres to the rotating bolter; to prevent this evil an improvement was patented in 1844, by which long beaters are jointed to the arms, which, in vibrating from one set of arms to the other, jar the bolter, and prevent the flour from adhering.—*Ellsworth's Report for* 1844, *pages* 502–3.

NEW MODE OF DIMINISHING HEAT.

Serious inconvenience frequently results from the heating of the stones by great rapidity of motion and friction, by which the flour becomes burnt and injured. In order to avoid this evil, letters patent were granted in 1845 for a new mode of diminishing the heat, which consists of an air tube, extending entirely around the stone at the outer part of its grinding face, from which branches extend along the grooves in the face of the stone. The whole is connected with such apparatus, that a constant current of cool air passes through the tubes, by which the stones are to be kept at a proper temperature.—*Burke's Report for* 1845, *page* 75.

BARK MILLS.

With the view to increase the grinding surface of these mills, and to insure a better action, a patent was granted in 1841 for forming the mill of several concentric rings, connected together by means of radial bars; at the top, for the fixed or bed grinder, and at the bottom for the runner. The concentric riggs of the runner work between those of the fixed or bed grinder; the teeth being formed on the inner and outer peripheries of the riggs, and the upper edges armed with cutters, to cut the bark into large pieces before the grinders begin to act.—*Ellsworth's Report for* 1844, *page* 503.

Several patents were also granted in 1845 for improvements in bark mills, some of which are also adapted to grinding corn in the cob, but the difference between them and those already in use, are of too trifling a character to require a particular description.

VELOCITY OF MACHINERY.

Under a patent granted in 1844, it is proposed to substitute for *the governors for regulating the velocity of machinery*, now generally employed, inclined or spiral vanes on a vertical shaft, working within a vessel containing water or other fluid. This shaft is capable of sliding up and down in its bearings, and is connected with any piece of machinery to be regulated in the usual manner. From this arrangement it must be evident that an increased velocity of the shaft will cause the vanes to meet with an increased resistance in passing through the water, and by their inclination to rise, and thus reduce the velocity of the moving party, and *vice versa*.—*Ellsworth's Rept.*, 1841, *p.* 503.

HORSE POWER.

Applications under this head were quite numerous during the years 1844–5, but most of them were rejected for want of novelty. But five patents were granted in 1845. Among the most important of which was one for improvements rendering

the machine convenient, compact, and comparatively free from friction, and granted to James Leffel, of Springfield, Ohio, August 20, 1845. As an illustrated description of this improvement will be given in a future number of the Mirror, we omit it here.

NOTICE TO PATRONS.

In the foregoing summary of the Commissioners' Reports, for the years 1844 and 1845, which we here conclude, we have presented our readers such subjects as were susceptible of description without illustration, in order to afford general information upon such subjects. Although there are many that we have omitted to mention, as they are mostly of a nature that could not be readily comprehended unaccompanied with illustrations, yet they will be reported at length in the forthcoming numbers of the Mirror, illustrated when deemed of sufficient importance to the public.

Offering as an apology to our patrons the above reasons why so few illustrations have appeared in our numbers, which we have considered thus far only as preliminary, we take this opportunity to mention also, that the present, together with the two following numbers, have been delayed in consequence of new arrangements now being made by the proprietors, tending to much increase the value and interest of the Mirror. And that through the aid of a valuable correspondent a portion of our future pages will be filled with subjects especially valuable to our Mechanical readers, whose particular interests it is that we design to advance.

LAW REPORTS OF PATENT CASES.

NEWTON vs. THE GRAND JUNCTION RAILWAY COMPANY,

At Liverpool, before Mr. Justice Cresswell and a Special Jury. August 27, 1845.

INFRINGEMENT.

This was an action to recover compensation from the company for the alleged infringement of a patent taken out by the plaintiff on the 15th day of May, 1843, for certain improvements in the construction of boxes for the axles or axletrees of locomotive engines and carriages, and for the bearings or journals of machinery in general, and also improvements in oiling or lubricating the same. The invention purported to have been a communication from a Mr. Isaac Babbelt, an American, from Boston. Mr. Babbelt was in Liverpool in the year 1843, and had permission from the Liverpool and Manchester Railway Company to make experiments on two of the engines on their line. The result was satisfactory, and he afterwards sold the discovery to the present plaintiff.

A great number of pleas were put on the record. First, "not guilty;" secondly, that the plaintiff was not the first and true inventor; thirdly, that he did not duly enrol his specification; fourthly, that it was not sufficiently described in the specification; fifthly, that the invention was not an improvement; and sixthly, that at the time of taking out the patent the invention was not "a manufacture, nor used and known within the kingdom as described in the statute of *James*."

A great mass of evidence was adduced, to show the nature of the invention, its novelty, and the importance of the results in diminishing the wear and tear of locomotive engines. It appeared that the invention consisted in lining the semicircular brass "step" of the axle, which rested on the axle, and bore the weight of the carriage, with an alloy of a softer metal of considerable thickness, which was prevented from spreading and yielding to the pressure by a brass fillet along its edge. The step was lined by first polishing the inside, tinning it, and then placing within it a mould the size of the axle, or "journal," as it was called, running in the alloy while in a state of fusion. This alloy in cooling adhered to the tin and became incorporated with the brass step, fitting closely to the journal, or axle, which revolved in it.

A great number of witnesses were called to prove the advantage of this arrangement in diminishing friction, in preventing the heating of the axles, in needing a smaller supply of oil, and in enabling the bearing to run for a much longer time without the necessity of renewal or repair.

Mr. Fothergill, foreman to Sharp & Co., stated that he had for many years been employed in the manufacture of railway carriages, and that this improvement was new to him until the appearance of the patent in 1843. It was a very great improvement, and extremely useful in diminishing friction and preventing heating.

On cross-examination, he stated that he had, previous to that time, known tin and lead used to repair old brasses when they had ceased to fit from wear, and there was not time to substitute a new one. The lead or tin was run in to make it fit until a new one could be supplied. He had known various bearings of solid block tin used, but they did not answer.

Mr. Robert Stephenson, engineer to the London and Birmingham line was examined. He gave similar evidence as to the utility of the invention. He said, if the inside of the bearing were merely tinned, it would prevent heating, and that their coating would not spread by pressure. It would wear out sooner, and the fillet in the plaintiff's invention was useful in enabling them to run in a mass of alloy in a melted state, which coated the step to a considerable thickness, without spreading by pressure, as it would do without the fillet.

Mr. John Fairbairn, engineer at Manchester, gave similar statements as to the utility and novelty of the invention. He stated that he had known block tin and various alloys used for bearings, but always in a solid block. The novelty was in having an outer case, and running in the alloy.

Mr. Thomas Wilkinson, foreman to Bolton and Watts' Soho works, Mr. Jones, clerk to the Liverpool and Manchester company, near Newton, and others, were examined. Their evidence was to the same effect.

Mr. Michael Alison, out-door foreman of the locomotive department to the Liverpool and Manchester Railway company, stated that there had been a very great and marked improvement in the running of the engines since the introduction of this invention. The Kingfisher, the Heron, and the Ostrich, were fitted up with these bearings. Formerly, the brass bearings on the old construction would run from 400 to 1,000 miles. They would run, when fitted up pursuant to the patent, from 4000 to 10,000. The Kingfisher had run 20,000, and the bearings were still in good condition. A bearing now produced had run 32,000 miles without repairs.

Mr. Benjamin Lewis, Mr. Edward McConnell, engineers to the Birmingham and Gloucester Railway company; Mr. Benjamin Cubitt, Mr. Fernyhough, managers on the Eastern Counties line; Mr. Melling, engine-maker, at Rainhill, and others, repeated in a great measure, what had been said by the other witnesses as to the novelty and the utility of the invention.

Evidence of the infringement of the patent was also ad-

duced. It appeared that in the case of many of the old brass bearings, as well as in the new ones, when put in for the first time, the workmen were in the habit of tinning the inside of the brass, heating it, and then rubbing a stick of tin on it, so as to cause as much as possible to adhere. This had been pointed out to the Directors on several occasions by the managers, and the results in preventing friction, and diminishing the expenditure of oil, were mentioned. A long correspondence between the plaintiff and the secretary of the company was put in and read, the plaintiff claiming compensation from the company for the use of his patent. In one of these letters the secretary, denied that the use of the tinning, in the way described, was of very little benefit, and that they thought of abandoning it.

Mr. Wortley addressed the jury for the defence, and called a number of persons to show that at Nantwich, Bury, and other places, where the brasses used in cotton mills had become worn, or did not fit, it was very usual to run in a quantity of an alloy of tin. One of the witnesses said this was done by means of a mould inside, in which the alloy was run in a state of fusion. Another witness, Joseph Clarke, stated, that he had long before the existence of this patent purchased a lathe, the bearings of which were a good deal worn, and that he filled them up by melting an alloy into them so as to make them fit.

Mr. Hodge was called as a witness, and stated, that many years before the existence of this patent, in 1829, he had made a lathe, being then resident in Cornwall, the bearings of which were provided with a fillet and lined with an alloy, run in precisely in the manner described in the patent, the object being that which the patent proposed—the diminution of friction. There were then many bearings of the same kind in use in Cornwall. This lathe he afterwards took to London, and sold it there. He had not heard of it since, and did know that this improvement was then generally known. He afterwards made an experiment, with a view to improved bearings for the axles of a saw-mill. The improvement was the making of three longitudinal grooves along the surface of the brass bearing, and filling them up with an alloy. Nothing further, however, was done in the matter. The witness afterwards went to America, from which country he had but lately returned.

Mr. Baines replied, commenting strongly on the conduct of the company through their officers, who, he contended, had sought to evade the plaintiff's patent, and to get the benefit of his discovery without paying him that reasonable remuneration to which he was entitled.

His *Lordship* summed up. He said, the question for the jury would be, whether the defendant had violated the plaintiff's patent by using the whole or any part of his invention. If a patent is granted for a new combination of things known before, that does not prevent any other party from using that which was old. There was no evidence that the defendants had used the whole of the plaintiff's invention in the steps with the fillets as described in the patent; but it seemed established that their servants took old and new brasses, and after tinning them in the usual way, had, while the brasses were hot, with a stick of tin, laid on as much as they could, to the extent of from the sixteenth to the eighth of an inch. Many of these brasses were new, and it was not, therefore, the mere patching of old ones. Was that substantially an adoption of any part of the patent; had they, by thus laying on the tin, smoothing it in some cases with a soldering iron, as described, obtained some portion of the benefit of the invention; and was that part new?

The jury, after being out a considerable time, returned a verdict for the plaintiff—Damages, 1,000*l.*—*Lond. Repl. N. S. vol.* 6.

GEO. N. BENJAMIN JR., & H. B. TATHAM.

vs.

R. W. LOWBER, THOMAS OTIS LEROY, and DAVID SMITH.

In the Circuit Court of the United States, New York. In Equity.

INFRINGEMENT.

Before Judges NELSON and BETTS.

THE motion for an injunction against the defendants in this case to restrain them from infringement of the patent for LEAD PIPE MACHINERY, came up for argument on the 14th April, 1847.

This is a question having a full bearing upon the rights of American purchasers of the inventions of aliens. The high character of the Court itself, together with the legal reputation of the eminent counsel engaged, afforded ample evidence that a full discussion was had upon all the points affecting the positive decision in this case. The proof was ample as to the infraction of the *supposed* "Right" of the plaintiffs.

The plaintiffs claimed as *American patentees* under an assignment from C. & J. HANSON, the alien inventors.

The patent was resisted upon several grounds, viz:

1st. Want of novelty of invention. The defendants cited the machines of T. Burr, J. Hague, B. Titus, G. W. Potter, Jesse Fox, and several others.

2d. That the 15th section of the act of 1836, provides for a forfeiture of a patent if it can be proved "that the patentee of an alien, at the time the patent was granted, had failed or neglected for a space of eighteen months to put and continue on sale to the public, on reasonable terms, the invention or discovery for which the patent issued. It was contended that this provision applied to the American assignees and patentees, and that in fact a forfeiture had occurred by such failure and neglect.

3d. It was urged that a patent for this invention was originally issued in England; that it was first obtained in the United States in 1841, with a specification differing from the English patent; and that it had been surrendered and re-issued in 1846 with a new claim differing from both.

4th. That the defendants, Leroy and Smith, were not the owners of the machine, but merely supplied the material and sold the product.

There were other points of minor importance, and all of them were denied by the plaintiffs. The argument occupied the court four days. For the plaintiffs, George C. Goddard, Charles O'Conner, and S. P. Staples, Esqs. For the defendants, William Curtis Noyes and Daniel Lord, Jr., Esqs.

The decision of the court was given on the 21st instant, as follows: We are satisfied—

"1st. The specification of the patent to plaintiffs (re-issued 16th March, 1846) claims as the invention a combination of arrangement of the parts of machinery described, by which pipe, with the operation of Hydraulic pressure, is made with lead in a *set* or semi-fluid state.

"2d. That the machine used by the defendants is in substance the same as plaintiff's.

"3d. The patentees can legally take out the re-issued patent for more than is described in the surrendered one, if it does not exceed the actual discovery when the first was taken out.

"4th. The evidence satisfactorily establishes that the Hansons were the first and original discoverers of the combination of arrangements embraced in the patent.

"5th. The patentees, after the assignment of the right and the grant of the patent to them, took and held it, with all the

privileges of an American patent, and the alien clause in the 15th section of the act of 1836, applies only to alien patentees, and not to American assignees.

"6th. But even if the assignee takes the right with the limitation or condition of the alien, still the plaintiffs have satisfied the act. They need not prove that they have hawked the article about for a market, and that they tried to sell it to any person. Those seeking to defeat the patent must prove the plaintiffs neglected or refused to sell for reasonable prices when application was made to them.

"7th. The sales by the plaintiffs, and those they proposed, and offered, were of the invention or discovery within the meaning of the act.

"8th. The proof is sufficient to charge all the defendants directly and indirectly with using the machinery, and violation of the plaintiffs' rights.

"Let an injunction therefore issue."

FOREIGN INVENTIONS.

MANUFACTURE OF RAILWAY TIRE, CARRIAGE SPRINGS, &c. OF CAST-STEEL AND IRON COMBINED.

SPECIFICATION *of the Patent granted to* JOHN B. BROWN, *of Sheffield, in the county of York, London, merchant and manufacturer, for Improvements in combining Cast-steel with Iron, and in the construction of Carriage Springs.*—Sealed October 10, 1844.

To all to whom these presents shall come, &c. &c.—My invention relates:

Firstly, to improvements in combining cast-steel with iron, when manufacturing railway tyre; and,

Secondly, my invention relates to improvements in the construction of carriage springs; and, in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me. And first, of the manufacture of tyre for railway wheels, by combining cast-steel with iron. According to this part of my invention, I make bars of railway wheels, composed of cast-steel combined with iron, in the following manner: I take a block of iron, of such weight as will, together with the steel, make the size of bar suitable for the tyre of a railway wheel. The block of iron I heat to nearly the point of fusion, and place it in a cast-iron mould of such depth as to receive the iron and the cast-steel to be combined therewith; such mould I prefer to be divided vertically into two parts, yet so as to be readily clamped together when the piece of iron has been introduced; and immediately the iron has been put into the mould and the mould clamped, I pour in the melted steel which I have ready in a crucible or crucibles, and the steel and iron combine into one mass; which I then draw out into a bar, which I afterwards pass between grooved rollers, in order to obtain the section of railway tyre I desire. It will be found that by these means cast-steel may be combined with iron in the manufacture of railway tyre of a superior character to the tyre heretofore made by welding steel to iron for these purposes.

I would remark in this respect to this part of my invention, that I do not claim the combining of steel and iron for railway purposes, nor do I claim the combining iron or steel in the manner above described, when not in the manufacture of tyre for railway wheels.

I will now describe the second part of my invention, which relates to those descriptions of springs for carriages which are made up of series of plates, which in action move or slide on each other, and part of these improvements consists in forming channels, grooves, or recesses in the surfaces of the plates to contain grease or other lubricating matter, which will gradually work out from the grooves or recesses as the springs are used, by the sliding or moving action which takes place in respect of the various plates. In carrying out this part of my invention, I have formed grooves longitudinally when rolling the plates in place of forming the plates plain on their surfaces; hence, when the series of plates are put together to make up a spring, in place of their surfaces being in contact at all parts, and rubbing or sliding on each other as heretofore, there will be grooves, or there may be other shaped recesses or hollows, into which (when putting the spring together) is placed grease or other lubricating material, by which means the plates of springs will be kept lubricated. I would remark in respect to this part of my invention, that I do not confine myself to any particular shape or form of recesses or hollows, as they may be varied, so long as they are suitable for receiving lubricating matter between the various plates of which carriage springs are composed; though, I believe, the most convenient form will be a longitudinal groove or grooves, formed on one surface of each plate of which a spring is composed.

Another part of my invention consists in forming such descriptions of carriage springs of two-widths of plates, in place of having all the plates of one width as heretofore. In carrying out this part of my invention, I will suppose that the carriage spring to be made according thereto is to be a strong spring for railway purposes, and that it is to consist of plates three inches wide, in which case, in place of having all the plates three inches wide, I use other and narrower plates of two inches wide, and, in making up a spring, I introduce a narrow plate between each two wide plates; hence the spring will not have so much extent of rubbing surfaces between the plates, as when the plates are all of one width as heretofore, by which a very beneficial result will be obtained. And I would remark that, although I have mentioned three-inch wide plates, combined with two-inch wide plates, in making up a carriage spring of a series of plates I do not confine myself thereto, as the relation of widths of the plates may be varied, though I believe the relation above given very proper for the purpose of obtaining the advantages of this part of my invention.

Having thus described the nature of my invention, and the best means I am acquainted with for the performing the same, I would have it understood, that what I claim is,

Firstly, the mode of combining cast-steel with iron, when manufacturing railway tyre;

Secondly, I claim the mode of constructing carriage springs, by forming grooves or recesses in the plates, as herein described. And I also claim the mode of constructing carriage springs by combining plates of different widths, as herein described, &c.—*Lond. Rept. N. S, vol.* 6, *p.* 30.

IMPROVEMENT IN PREVENTING INCRUSTATION IN STEAM BOILERS AND STEAM GENERATORS.

Letters Patent were granted, Nov. 16, 1844, *to* FRANCIS WATTEEU, *of Finsbury square, in the city of London, merchant, for Improvements in preventing Incrustation in Steam Boilers and Steam Generators.*

The object of this invention is to prevent incrustation in steam boilers, by introducing therein a mixture composed of various chemical substances, according to the size of the boiler, and the nature or composition of the water employed for feeding the same.

THE manner of using the invention is as follows:

For a boiler of from ten-horse power, supplied with water containing sulphate of lime, I use the mixture No. 1, composed of 4 lbs. of catechu, 2 lbs. of dextrine, 4 lbs. of crystals of soda, 1 lb. of American potashes, 1 lb. of beet root, 1 lb. of alum, and 1 lb. of gum arabic. For a boiler of the same power, supplied with water containing chloride of lime, I employ the

mixture No. 2, composed of 4 lbs. of turmeric, 2 lbs. of dextrine, 4 lbs. of bicarbonate of soda, 1 lb. of American potash, 1 lb. of molasses, and 1 lb. of alum. For a boiler of the same power, supplied with ferruginous water, I employ the mixture No. 3, composed of 4 lbs. of gambia, 4 lbs. of salts of soda, 2 lbs. of dextrine, 1 lb. of Russian potashes, 1 lb. of sugar, 1 lb. of alum, and 1 lb. of gum arabic. For a boiler of the same power, supplied with sea water, I employ the mixture No. 4, composed of 4 lbs. of catechu, 4 lbs. of sulphate of soda, 4 lbs. of dextrine, 1 lb. of alum, and 1 lb. of gum arabic. These substances must be mixed with about 2 quarts of water, and the boiler supplied therewith once a month for ordinary cases of incrustation, once a fortnight for hard or extensive incrustation, and once in six weeks for a very slight incrustation. Any competent engineer will be able, from this description, to judge how often the mixture is required to be applied. For boilers of from 10 to 20-horse power, the quantity of each ingredient must be increased one-quarter. For boilers of from 20 to 30-horse power, each ingredient must be increased one-half. For boilers of from 30 to 40 horse power, the quantity of each ingredient must be increased three-fourths. For boilers of from 40 to 50-horse power, the quantity must be doubled, and so increasing one-fourth for every additional 10-horse power. For steam-boilers of 30 horse power, supplied with river water, the following mixture is to be employed, to be renewed with every fresh supply of water: 6 lbs. crystals of soda, 6 lbs. dextrine, 2 lbs. alum, 1 lb. pearlash, 2 lbs. sugar. For steamboat boilers of 30-horse power, supplied with sea water, the following mixture (renewed with each fresh supply of water) is to be employed: 8 lbs. of carbonate of soda, 8 lbs. dextrine, 1 lb. alum, 1 lb. Russian potashes, 4 lbs. sugar. The ingredients are to be increased in quantity one-fourth for every additional 10-horse power. For a 30-horse locomotive boiler, the following mixture is to be employed, and renewed every six days: 6 lbs. crystals of soda, 1 lb. dextrine, 1 lb. alum, 2 lbs. of sugar. The patentee does not confine himself to the exact proportions above set forth, as they may be varied.

Claim.—"I would remark, that I am aware that soda and potash have before been used for such purposes; I do not, therefore, claim the use of either soda or potash separately; but what I claim is, their use combined with some of the other matters herein mentioned."—*Lond. Rept. vol. 6, p. 239, N. S.*

IMPROVEMENTS IN TREATING HEMP, FLAX, ETC.

Letters Patent were granted to Moses Poole, *of Lincoln's Inn, London, gentleman, for Improvements in treating Hemp, Flax, and other Textile Plants.* Sealed Dec. 30, 1844. [Communicated.]

This invention relates to certain chemical means of treating hemp, flax, and other textile plants, for the purpose of effectually separating the fibres of the plants from the resinous, gummy matters which are mixed up with the plants, and which is known by the name of "setting." According to the ordinary plan the plants are submitted to maceration, either in still or running water, and the change of the temperature to which the flax is exposed, produces more or less a state of decomposition of the glutinous parts, and it is difficult to ascertain the state of the material under operation. The putrid decomposition of these matters affect the water, and render it prejudicial to cattle. Mechanical means have been suggested for the purpose of replacing the decomposition, but it was found that, although the vegetable fibres were separated from the stalks, yet the glutinous matters which join together the filaments were not separated; and various other methods have been attempted, but without success. This invention consists of a mode of performing the operation of rotting by steeping flax, hemp, &c. in a solution of acid water, by which the process is rapidly carried through without any offensive smell, and continually under the control of the workman, as he is enabled to see how the process is going on. The manner of operating upon hemp is as follows, and may be carried on either in the open air or in a covered place, and in any season of the year; but when in the open air, the upper layer, or bed of the material under operation, should be covered over either with leaves or straw, so as to prevent them drying too rapidly. I use sulphuric acid, and it is to be mixed in the proportion of 200 parts of water to 1 part of ordinary sulphuric acid of commerce at 66 degrees, the whole to be mixed together and placed in a wooden trough of sufficient depth, so that when the sheaves of hemp are placed therein, there will be sufficient acid and water to cover over them. The sheaves of hemp are first to be loosened and moistened in any convenient manner: the mode I prefer is to lay the bundles or sheaves on pieces of wood placed a little distance above the ground, (the heap of hemp can, without inconvenience, be three feet high,) and by pouring on water, have them thoroughly moistened; or, if it is convenient to carry on the process near a river, they may be immersed therein, for the purpose of being thoroughly soaked through. It is then to be allowed to remain in that state for eight or nine hours, and then the process of moistening is to be repeated. To carry on the process with convenience, I prefer that the first operation should be performed in the morning, and the second in the evening, and then it is to remain until the next morning, and then it will be in a fit state to be immersed in the sulphuric acid and water. The bundle of hemp, in the loosensd state, is then to be immersed in the trough containing the sulphuric acid water before spoken of, and pressed down, so that the acid and water will penetrate all through. When it is taken out and drained it is again placed upon the pieces of wood. In order to render the action of the acid uniform and regular, the position of the bundles of hemp should be changed after each immersion in such manner, that, when operating with two or more bundles of hemp, the upper layer of the heap be placed underneath, after the following immersion, and *vice versa*. About five or six hours, more or less, the bundles are to be again moistened, and allowed to stand till he next morning, and then they are to be again submitted to the acid water, and five or six hours afterwards moistened, and so on every day until the operation of rotting is perfected. When the hemp has been sufficiently treated by the above process, the stalks will present some black spots at different parts, which at first are very small, but which rapidly increase as the process goes on. At this stage the operation should be watched with great care, and the process of rotting is complete, when by bending the hemp the filaments will readily separate on all the surface of the stalk, which it leaves free. The process of immersing in the acid water is then to cease, and all that remains to be done is to well wash them with water. At this part of the process it is better that the bundles should be wholly immersed in water to destroy the effect of the acid. If it is feared, after this immersion, that the hemp still retains some parts of acid, it will then be advisable to submit it to an alkaline bath, and again be watered two or three times. It is then to be dried and crushed by the ordinary means. The alkaline bath is a weak solution of soda or potash, in the proportion of 1 part of soda or potash for 10,000 parts of water. When the acid and water is used by the continued action of the process, the quantity is to be supplied as before explained.

In operating upon flax the process is the same, with the exception that the solution of acid and water is weaker; there is only one part of acid to 380 to 400 parts of water; and more care is necessary in the process, as the fibres of flax are more easily destroyed by the acid than hemp. The patentee does not confine himself to the use of sulphuric acid, as other acid may be used. The same process is applicable to all other textile plants, care being observed that the quantity of acid be in

proportion to the strength of the outer skin of the plant to be operated upon.

Having thus described the nature of the invention, and the manner of performing the same, the patentee would have it understood that what he claims as his invention is the mode of treating hemp, flax, and other textile plants with acid and water, as herein described.—*Lond. Rept. vol.* 6, *N. S. p.* 53.

PREPARING AND COMBING WOOL.

SPECIFICATION *of a Patent, granted Sept.* 27, 1844, *to* SAMUEL CUNLIFFE LISTER, *of Manningham, in the county of York, (England,) worsted spinner, for Improvements in preparing and combing Wool.*

"This improvement in preparing wool consists in passing wool through a screw gill before being combed, as I find it very beneficial in opening out the staples, and separating the fibres of wool, and, at the same time, obtaining an endless sliver, ready for filling on to the combs.

"The improvement in combing wool consists in causing the saddle comb to recede at the time that the revolving combs are passing through the wool, and thereby relieving the strain upon the wool." The inventor has not thought it necessary to show drawings, as he says it is a matter of easy application to the machines now in use, and can be done in a variety of ways; any mechanic having the idea given him can easily apply it, &c.

IMPROVEMENT IN THE MANUFACTURE OF SOAP.

Letters Patent, granted March 17, 1845, *to* WILLIAM LLOYD CALDECOTT, *in the city of Bath, (Eng.,) for an Improvement in the Manufacture of Soap.*

This invention consists of combining Barbadoes tar with soap, so as to produce a new manufacture of soap. And the invention also consists in combining other bituminous substances with soap—such as pretolium, and other varieties of natural naphtha. And in order that his invention may be more fully understood and readily carried into effect, the inventor proceeds to describe the means pursued in the following words:

"I prefer to use tar, generally known in commerce as Barbadoes tar, such tar being obtained from water arising on an estate called Mount Hall, as well as on other estates in the parishes of St. Andrews and St. Joseph, in the island of Barbadoes. The compounded soap thus produced, when in use, is such that the soap alone retains its solvent powers in water; the Barbadoes tar, or other bituminous substance, remains insoluble, and floats on the surface of the water; and hence, in cutaneous eruptions, the soap in solution detaches any foreign matter from the skin, and thus prepares the skin for the subsequent deposit of the tar, by which its curative powers are brought into action. The peculiar properties of the compound soap prevent that unpleasant irritation so often experienced from the employment of ordinary soap. The Barbadoes tar, or other bituminous substances, is combined with soap after the same has been made in the ordinary manner, and when the same is about of a temperature of a little below that of boiling water, or 210° of Fahrenheit, and the proportion in which I combine the tar with the soap is about 15 per cent. of the tar in weight of the soap, and they are combined by stirring till the whole are intimately mixed The soap is to be formed of the best materials, and should consist of the best tallow, with its requisite proportions of alkali to form the saponaceous mass, and, when properly united, then to add any or either of the above-named bituminous substances, but by preference, Barbadoes tar, otherwise called Naphtha, from the natural springs of Barbadoes, as before mentioned."

Having thus described the nature of my invention, and the best means I am acquainted with for performing the same, I would have it understood, that what I claim is the combining Barbadoes tar, or other variety of natural naphtha, with soap, as herein described. In witness, &c.—*Lond. Rept. vol.* 6, *N. S., p.* 171.

AGRICULTURAL DEPARTMENT.

GUANO, OR HUANU.*

FOR the following interesting account of this extraordinary substance as a manure, which is exciting so much interest among agriculturalists generally, we are indebted to that very useful, and at the same time entertaining work upon "EUROPEAN AGRICULTURE AND RURAL ECONOMY," by our distinguished countryman, HENRY COLMAN, Esq., who, it may be recollected, was sent on an agricultural tour through Europe, under the patronage of the National and State Agricultural Societies of the United States, during the year 1843. The results of Mr. Colman's mission are now contained in a handsomely printed octavo volume, under the above named title, recently published, simultaneously in this country by Mr. Arthur D. Phelps, of Boston, Mass., and in London by Messrs. Wiley & Putnam, and J. Chapman.

"I do not deem it necessary," says the author, "to go into the history of a substance which has been made so familiar by the public discussions which have taken place in relation to it. That it is an animal deposit is well established. It is the excrement of sea-birds accustomed to frequent certain islands in the Pacific Ocean and other places in the tropical latitudes. Its use as a manure is not new in those countries where it has been found. In Peru, the birds who caused the deposit were protected by severe laws, and the value of the manure was fully understood. The amount of the accumulations, considering the nature of the deposit, is immense, being represented by travellers as from three to seven hundred feet in depth. The number of birds is stated to be almost beyond calculation; and any person who will take the trouble to read in that delightful book, Wilson's Ornithology, the accounts of the roosting-places of the passenger-pigeon in some of the Western States of America, will readily confide in well-authenticated accounts of the number of these birds, which would otherwise be deemed egregious exaggerations.

"These deposits are made in a climate where, for a considerable part of the year, little rain falls, and where the intense heat of the sun forms such a crust over the deposit, that it becomes almost insoluble. Supposing a deposit to be made of two inches a year for three thousand years, this would give a depth of five hundred feet; and, therefore, the report of the depth of these deposits, though surprising, is by no means intrinsically incredible. The extraordinary effect of this manure is another remarkable circumstance. The dung of the domestic pigeon or fowl is amongst the strongest used, but it is not so powerful as guano. In the excrements of birds, the solid and liquid portions are combined. This is one secret of their

* The original word is *Huanu*, which is a term in the Quichua dialect, meaning "animal dung;" for example, Huanaculuanu, [excrement of the Huanacu.] As the word is now generally used it is an abbreviation of Pishu Huanu, Bird-dung. The Spaniards have now finally converted the final syllable *nu* into *no*, as they do in all the words adopted from the Quichua which have the like termination. The European Orthography Guano which is also followed in Spanish America, is quite erroneous, for the Quichua language is deficient in the letter *g*, as it is in several other consonants. The *h* in the commencement of the word is strongly aspirated, whence the error in the orthography of the Spaniards, who have sadly corrupted the language of the Autochthones of Peru.—*Von Tschudi's Travels in Peru.*

strength. In the case of the guano birds, their food is wholly fish, and not, as with our domestic birds, mainly farinaceous; and therefore it abounds in nitrogen, and in bony substances, or phosphates.

"The secret of the extraordinary success of this manure is not yet solved, however nearly a solution may have been approximated. This is evident from the fact that, after the most exact and minute analysis of this manure, conducted with all the skill and science which can be brought to bear upon it, no one has been able to form an artificial guano with any degree of its efficacy. Chemistry determines with wonderful accuracy its inorganic properties; but 50 per cent of it is organic matter, and this being dissipated or lost in the process of analysis, nothing is known of it but its absolute quantity. Every common farmer knows that horse manure, cow manure, hog manure, and sheep manure, are all specifically different, and their effects and uses are different; and I believe this depends not more upon a difference in their organic elements, than upon some specific effects of their organic elements; and though horses, and cows, and sheep, should be fed upon precisely the same food, their excrementitious matter would be specifically different, and the effect upon vegetation different. I pretend not to say in what this difference consists; this, chemistry has not yet reached, though I can hope the goal will presently be attained. I am not, therefore, satisfied with any account which chemistry has given of guano, so far as its operation is concerned. It has done much, and is clearly able to determine the different specific values of different samples. This is of great importance to the farmer, and not less so to the honest dealer. But the specific qualities of this extraordinary manure, as proved by its effects, are, I presume to believe, with all possible respect for science, yet to be discovered.

"One, indeed, may well speak of its effects as extraordinary, from what I myself have seen. In Scotland, last autumn, two shrubs were shown to me, sweet-briers, growing in front of a two-story house, and trained upon its sides; one at one, the other at the other end. The soil in which they grew, the aspect, and other circumstances, were the same. One, in the season, had grown six or seven feet; the other, nearly thirty feet! It had actually climbed to the roof of the house, and turned and hung down, reaching half the distance down from the roof to the ground. I judge this could not have been less than thirty feet. This had been repeatedly watered with liquid guano, by the hands of its fair cultivator; for this was another experiment by a lady, (which I hope my American friends will bear in mind.) The other had received no special care or manuring. This charming woman, surrounded by her lovely children, was equally engaged in teaching the young idea as the sweet-brier how to shoot; and they, too, showed the beautiful results of devoted and assiduous culture.

"I have seen the extraordinary effects of the application of guano all over the country, and I have met with very few instances of disappointment. I have been favored with a great many reports of its application; but my readers will, I think, be better satisfied with general results than with a long list of particular examples.

When I speak of its extraordinary effects, I yet do not consider them as so surprising as the effects of gypsum in many parts of the United States, whose operations, I venture to say, remains wholly unexplained. I do not, of course, mean to imply that one can be substituted for the other. The effects of half a bushel of finely powdered gypsum, scattered over an acre of land, in some places, in increasing the crop of grass, and in respect to some other crops, is amazing; yet, in all England, I have not been able to find a single well-attested example of its being applied with any benefit whatever. The application of guano has been made in England and Scotland to all kinds of plants, and in some instances with great success; indeed, with rarely a failure.

"It has been used for turnips, barley, wheat, oats, grass, garden vegetables, onions, asparagus, flowers, and trees. I have seen its application in all these cases, excepting asparagus and trees; but the testimony which certifies its success in these cases is unquestionable. Comparisons made between guano and other manures, are not quite satisfactory in respect to quantities, because it is obviously very different to institute any instructive comparison between so many pounds of guano and so many loads of manure—manure is so various in its nature, quality, bulk, &c.; but it will be quite easy to compare the two in respect to the ease or difficulty of their transportation, and of their application to the plant or soil. Comparisons, likewise, in respect to the cost of different applications, as made here, would be of little use in the United States, as prices of manure and of labor are totally different; and the one can afford no rule for the other. In this matter the farmers of the United States must judge for themselves.

"The quantity which it is deemed best to apply varies from two hundred weight to four hundred weight, or five hundred weight. Frequent cases have occurred of the application of five hundred weight and eight hundred weight to a statute acre, with great advantage. Cases are on record of twenty-nine and thirty hundred weight being applied to grass-land, but not, most certainly, a remunerating increase of crop. I met one farmer in Lincolnshire, who thought more than one hundred weight applied to turnips was unnecessary; but the almost universal testimony is in favor of three hundred weight. A bushel of sifted guano weighs from fifty-two to fifty-four pounds.

"In regard to the mode of application, it is well settled that it should seldom be applied alone. To garden vegetables, or greenhouse plants, it may be applied in a state of solution in water. In field cultivation, it may be applied by being mixed with four or six times its quantity of dry earth or mould. In this way it may be sown broadcast over the field, and then lightly harrowed or turned in; or it may be sown first in the same drill where the seed is to be dropped; great care must be taken, however, that it does not come in contact with the seed, or it will destroy its vegetable powers. It is desirable that it should be covered as soon as may be after being sown. The best farmers give a caution against mixing it with lime, or bones, or wood-ashes, as these substances coming in contact with it will drive off its ammonia.

"Where a portion of barn manure has been applied in conjunction with guano, the mixture has been found much more efficacious than the manure when applied alone. In an application which I saw, guano gave seven tons of turnips increase to an acre over an artificial manure which had been much praised, and was applied at the same time.

A good mode of preparing it for application is to mix it with fine earth, on the headlands of the field where it is to be used, forming it, with the earth, into alternate layers, in the proportion of earth to the guano of three to one; and after it has remained two or three days, thoroughly incorporating them together by turning over the heap.

With potatoes, it should be placed in the drill, or hole, but not in contact with the set or seed; and for Indian corn—a case in which I have had no experience—it would seem advisable to adopt a similar method.

"The experiments of Mr. John Dudgeon have been given to the public at large. As I had the pleasure of visiting his farm, one of the best managed in the kingdom, and saw some of the experiments going on, I feel at liberty to give them, and it may be interesting to my readers to have them in his own words.

"The following results, communicated by John Dudgeon, Esq., of Spylan, to the Highland and Agricultural Society, in April, 1843, show, first, the relative produce of turnips from *guano*, applied at the rate of three hundred weight, and four

hundred weight, and five hundred weight per acre, in contemplation with the produce from the farm-yard manure, applied at the rate of eighteen yards per acre; secondly, the trial of *bone-dust* with coal-ashes against *guano alone*, and guano mixed with a portion of *sulphate of soda;* thirdly, the trial of *guano alone* against *bone-dust alone*.

" 'The first experiment was in a field lying upon a slope, with a southern exposure, the soil consisting of a good loam upon a retentive sub-soil; the upper part of the field, for about a fourth of its length, gradually becoming shallower in soil, and resting upon a hard Muirland pan, so that the value of the lower portion of the field, as compared with the upper, may be estimated as three to one. This field has been but imperfectly drained. It was dunged in the usual way, immediately before sowing, with well-prepared farm-yard manure, at the rate of about eighteen cubic yards to the acre, with the exception of that portion to which guano was applied. Two ordinary drills for the latter were selected at random, and the guano distributed in them by hand, without any mixture, at the rate of three hundred weight per acre. Leaving an interval of three drills, which were manured like the rest of the field, two other drills were treated with guano, at the rate of four hundred weight per acre; and finally, with a similar space intervening, two drills with guano at the rate of fully more than five hundred weight per acre. No difference appeared in the turnips (which were the variety named "Dale's" hybrid,) previous to singling or thinning the plants with the hoe; after that, however, the superiority of the drills with the guano became manifest, and continued to increase with the growth of the turnips, particularly in those drills which received the greatest quantity, till the whole were carted off in October, when the produce (topped and rooted) of the whole six drills were weighed, each two as differing in the quantity of guano applied, compared with two drills immediately adjoining, on which the farm-yard manure had been used. The following was the result:

Kinds of Manure.	*Quantities applied.*	*Produce per Acre.*
Two drills with GUANO,	5 cwt. per acre,	25 cwt. 5 st.
" " dung,	18 yds. "	18 " 7 "
" " GUANO,	4 cwt. "	22 " 6 "
" " dung,	18 yds. "	19 " 7 "
" " GUANO,	3 cwt. "	20 " 6 "
" " dung,	18 yds. "	19 " 2 "

" 'In the second experiment, a comparative trial was made between guano *and bone-dust mixed with coal ashes*. The ashes were sifted, and intimately mixed with the bones, some days before being applied, in the proportion of sixteen bushels of bones and eight of ashes, per acre. The quantity of guano applied was at the rate of three hundred weight per acre upon four drills, two and two together, at an interval of eight drills manured with bones and ashes. Then, at a similar interval, followed two drills, operated upon with guano, together with *sulphate of soda*, (Glauber salts,) at the rate of four hundred weight per acre—being the only instance, in the course of these experiments, in which any foreign substance was used with guano. The turnips were drawn about the end of November, and on a comparison of the weight of the crop on two of the four drills done with *guano alone*, with the produce of the average of four drills, nearly immediately adjoining, manured with *bone-dust and ashes*, the result stood thus, (the plants being topped and rooted):

Manures.	*Produce per Acre.*
GUANO alone - - -	23 cwt. 2 st.
Guano and sulphate of soda -	23 " 0 "
Bone-dust - - -	19 " 2 "

" 'In the third experiment, guano was used against *bone-dust alone*, applied, as is usual in that district, at the rate of sixteen bushels per acre. The guano was used at the rate of two hundred weight only per acre. The drills manured with the latter showed a very early superiority, and were ready for the hoe fully eight days earlier than the rest of the field. This more vigorous growth they maintained throughout; and when the turnips (the white stone globe variety) were weighed, on the 22d of March, after standing throughout the winter, the result was as follows, (the roots and tops being in this instance retained:)

Two drills guano - - -	31 cwt. 4 st.
" " bone-dust - - -	24 cwt. 7 st.' "

" Guano has been applied to winter wheat, both in drills and broad-cast, and with signal success. It has been applied likewise, with great success, to grass and pasture land, as the following statement will show:

" On an eight-acre field, sown with three hundred weight of guano, and three bushels of Italian rye-grass per acre, on the 29th of April, cut on the 3d of August, the produce weighed, when cut, eighteen tons, and when dry and ready for stack four tons per acre. Much of this crop was upwards of five feet long. So rapid was the growth, that, fifty hours after cutting, it had again sprung up to the height of three and one-eighth inches. With such grass, and such manure, so easily convertible into liquid, I see no reason to doubt that the cottager, with his five roods of land, could supply his house with vegetables, and cow with winter and summer food, thereby providing for his family an almost entire subsistence.

" It has been questioned whether its effects will be permanent. I can only answer, that I have seen its obviously beneficial effects three years after its application upon grass. How much longer its efficacy may be expected to continue, experience only can determine.

" Several kinds of guano have been brought into great Britain; but the great distinction is between that from the Island of Ichaboe, on the coast of Africa, and that from the islands in the Pacific. The former seems entirely deficient in uric acid, and consequently lacks what is deemed a valuable element in vegetation. The comparative value of the two in public estimation, and in the opinion of a distinguished chemist, is supposed to be as four to five. The supply from Ichaboe is said to be exhausted, the enormous quantity of five to six hundred thousand tons having been taken, as is stated, from that single island.

" I should do wrong to say that guano is always successful. There were many complaints this year of its failure, attributed to the excessive droughts which prevailed at the beginning of the season. A farmer likewise, in Cambridgeshire, communicates to the Royal Agricultural Society, in their last journal, his failure, in two successive applications of it, to crops of barley. In neither instance does any advantage appear to have been gained. He attributes this to something in the nature or character of the soil; but this, without further trials, must be set down as wholly conjectural.

" It is quite proper, likewise, that I should urge upon the farmers of the United States, that, however auspicious and brilliant may be the promises which guano holds out to them, they must not overlook the resources for enriching their own lands within their own reach. The following statement will strengthen this advice:

" Philip Pusey, Esq., M. P., than whom, I believe, wherever his character for intelligent and philosophical observation is known it will be universally admitted, there is no higher agricultural authority in England, informed me, that the last season he carted to the headlands of one of his fields a quantity of loam, mixed with coal ashes and rubbish, and having formed it into a bed, heaped upon it a quantity of barn manure, from the drippings of which the loam, &c., became completely saturated. Upon the application of this to the land for a crop of turnips, by the side of the same crop manured with three hundred weight of guano, the advantage was very greatly in favor of the former.

"Mr. James Smith, of Deanster, states that a friend of his manured three acres; the first, with fifteen tons of stable dung, cost £4; the second acre, with three hundred weight of guano, cost £1 6s.; the third acre, with eight tons of liquid manure, cost £1 6s.; and the crop on the last was far the best. Dr. Playfair was kind enough to communicate to me this statement.

"In an admirable lecture, delivered by the last-named active and intelligent friend of an improved agriculture, at the meeting of the Royal Agricultural Society, that gentleman saw fit to state that one pound of urine contained materials for producing one pound of wheat; and that the effete matter which runs into the Thames annually, from the city of London, amounts to

1,095,000,000 pounds in one year;

and contains nitrogen sufficient to produce

1,600,000,000 pounds of wheat,
1,800,000,000 pounds of barley;

and, calculating this waste at a moderate value, for agricultural purposes, London suffers a loss of £1,000,000 sterling, or 5,000,000 dollars per year.

"These curious statistics will, I know, give no offence to any sensible person; and they may suggest considerations of the very highest moment to the rising cities of the United States, where the sanatory and economical arrangements are not completed, and in many cases not begun. They especially enforce upon every individual farmer the duty of examining and husbanding, with a miserly frugality, all the resources of his own farm, even the most inconsiderable and humble. They have, I may be allowed to say, a far higher use, by leading the reflecting and serious mind to admire and adore the never-ending circles of the divine beneficence; the mixed and wonderful compensation and mutual subserviences which pervade the whole system of nature; and, above all, that constant miracle of miracles, going on continually in the vegetable world, by which the most worthless and most offensive substances are returned again to bless the animal creation, in those substantial products by which life is sustained, and comfort everywhere diffused, in fruits most delicious to the senses, and in plants and flowers, which, in their variety, and beauty, and wonderful glory and splendor, infinitely surpass the highest triumphs of human art and luxury.

"I think proper here to subjoin several analysis of guano with which I have been favored by a most accurate chemist, Mr. E. F. Teschemacher.

"'These analyses were performed,' says that chemist, 'during the course of my business, and are so arranged that a comparison may be easily made between them. Upon comparing them with those of other analysts I find them generally to agree in all their essential characters.

No. 1.—Peruvian.

100 parts consist of 9 parts of ammonia, combined with phosphoric, carbonic, uric, and organic acids, forming, of

Ammoniacal salts	40
Animal organic matter	6½
Sulphate and muriate of potash and soda	11½
Phosphate of lime and magnesia	29½
Sand	1
Water	11½
	100

The Peruvian contains 11½ parts of uric acid.

No. 2.—Bolivian.

100 parts contain 10½ parts ammonia, combined as in No. 1, forming, of

Ammonial salts	36
Animal organic matter	5
Sulphate and muriate of potash and soda	15¾
Phosphate of lime and magnesia	27¾
Sand	1½
Water	14
	100

The Bolivian contains 3 per cent. of uric acid.

The uric acid is considered to furnish the crops with additional ammonia, which, after application, is given out by degrees.

No. 3.—Chilian.

100 parts containing 3 parts ammonia, combined with phosphoric, oxalic, carbonic, humic, and organic acids, forming, of

Ammoniacal salts	12½
Animal organic matter	2½
Sulphate and muriate of potash and soda	7½
Phosphate of lime and magnesia and oxalate lime	53
Sand	2
Water	22½
	100

This guano contains no uric acid.

No. 4.—Ichaboe Guano.

100 parts containing 7½ parts ammonia, combined with phosphorics oxalic, carbonic, and humic acids, forming, of

Ammoniacal salts	26½
Animal organic matter	7½
Sulphate and muriate of potash, and phosphate potash	10
Phosphate lime, and magnesia, and oxalate lime	30
Sand	1
Water	25
	100

Contains no uric acid.

No. 5.—Angra de Paquena.

100 parts contain 5 parts ammonia, combined as in No. 4, forming, of

Ammoniacal salts	20
Animal organic matter	5
Sulphate and muriate of potash, and phosphate potash,	11
Phosphate of lime and magnesia, and oxalate lime,	32
Sand	2
Water	30
	100

No uric acid.

No. 6.—Possession Island.

Very like that from Angra de Pequena, but very lumpy.
No Uric acid.

No 7.—Pedestal Point.

100 parts contain 4½ parts ammonia, combined as in No. 4, forming, of

Ammoniacal salts	14
Animal organic matter	6
Sulphate and muriate of potash, and phosphate potash	6½
Phosphate of lime and magnesia, and oxalate lime,	37
Sand	7
Water	29½
	100

No uric acid.

No 8.—Bird Islands; Algoa Bay.

100 parts contain 2½ parts ammonia, combined as in No. 4, forming, of

Ammoniacal salts	10½
Animal organic matters	8½
Sulphate and muriate of potash	2½
Phosphate of lime and magnesia, (no oxalate lime,)	62
Sand	1½
Water	15
	100

No. 8 contains no uric acid.

No 1 to 3 are South American guanoes.

No. 4 to 8 are African guanoes.

I have examined guano from other localities, but as I do not know those localities, I have omitted them in the list.

Guano Testing.

1. A small portion, about 100 grains, mixed and rubbed with 10 parts of chalk to 1 part of quick-lime, should give out a strong smell of ammonia; and on holding over the mixture a glass rod moistened with muriatic acid, a dense white vapor should be given off. If this effect does not take place, the guano will contain very little ammoniacal salts.

2. 100 grains guano, heated to redness in a Hessian crucible, should leave a white ash. This white ash should be nearly soluble in dilute muriatic acid. The residue should not exceed 10 grains; in good guano, the residue would be only 1 or 2 grains.

"I add to these some analyses forwarded to me from the Edinburgh Agricultural Association, by my esteemed friend, Mr. John P. Norton:

Two Guanoes from Ichaboe.

	No. 1	No. 11.
Water	20.46	18.00
Organic matter and ammonical salts	44.96	52.60
Sulphate of Soda and potash, with common salt	4.49	4.89
Phosphates of lime and magnesia	27.31	19.22
Carbonate of lime	0.07 }	4.83
Silicious matter	2.15 }	
3 per cent. free ammoniac No. 1,	99.44	90.54

These are fair samples of the Ichaboe guanoes. Their only defect is too much water.

Two South American Guanoes.

	Peruvian	*Bolivian.*
Water and free ammonia	3.14	5.34
Organic matter and ammoniacal salts	63.52	58.00
Sulphate and muriate of soda	5.02	6.37
Phosphate of lime, and a little phos. of magnesia,	22.20	25.27
Carbonates of lime and magnesia	4.96	3.95
Insoluble solicious matter	1.16	1.07
	100.00	100.00

These are both most excellent guanoes. The small proportion of water is remarkable, and the large quantity of organic matter and ammoniacal salts. This first, and then the phosphates, are the criteria of value. Carbonate of lime, sulphate and muriate of soda, &c., are valuable manures, but may be bought lower than £6 or £8 per ton.

(*Artificial Guano*, (Potter's.)

Water	14.55
Organic matter	17.32
Salts soluble in water, consisting of common salt and gypsum, with a small quantity of potash and ammoniacal salts	40.43
Phosphate and carbonate of lime	11.61
Coarse sand, with bits of gypsum	16.06
	99.97

"This, therefore, contains 30 per cent. of water and sand. One by the same maker, previously examined, had about 30 per cent. of sand alone."

The following is from a chemist of the highest scientific character, Dr. Ure:

"Reserving, for the present, the more particular analyses, the following may be offered as the average result of those I have made of genuine guano, in reference to agricultural value:

Azotized organic matter, including urate of ammonia, and capable of affording from 8 to 17 per cent. of ammonia by slow decomposition in the soil	50.0
Water	11.0
Phosphate of lime	25.0
Ammonia, phosphate of magnesia, phosphate of ammonia, and oxalate of ammonia, containing from 4 to 9 per cent. of ammonia	13.0
Solicious matter from the crops of the birds	1.0
	100.0."

The first introduction of Guano into England, or the United States, is due to Commodore STEWART, who, as far back as the year 1825, sent two barrels of it to President Monroe as a present. Robert Smith, President of the Maryland State Agricultural Society, and Governor Lloyd, who were among the most enterprising farmers of that date, also received parcels of the same, and gave favorable reports of its effects upon Indian corn; but no measures were taken for a further supply, until it became an important article of trade a few years after. For a further notice we refer our readers to the Farmers' Library for July, 1845.—*Editor.*

GRANARY OF THE WEST.

THERE having been some difference of opinion as to the true locality of this Granary, (says the Toledo Blade,) and the facts necessary to give it a fixed habitation being in our possession, we have concluded to remove all doubt from the minds of intelligent inquirers, by giving the exports of breadstuffs for the last commercial year—1846; from the River region by New Orleans, and from the Lake region by way of Buffalo and Oswego. We shall also show that the bulk of the Lake exports proceeds from a small section of the Lake shore.

The interior portion of North America, drained by the Mississippi and St. Lawrence rivers, has been named by an eminent writer, the "North American Valley." As there are no natural barriers separating the basins of these rivers, and as they are intimately connected by artificial channels of Commerce, and the mutual interchange of their varied productions, it is convenient to speak of them as composing one great plain, under the name above given.

With the exception of the country drained by the Amazon, the North American Valley excels in natural resources any other on the globe. Its mild climate gives it a decided superiority over the valley of the Amazon.

Until quite recently the St. Lawrence, or Lake, portion of this interior plain has been unsettled. The borders of the Ohio and its tributaries were comparatively well settled before the country of the Lakes attracted much attention. All this is being changed. Immigration, since 1830, has poured along the United States borders of the great Lakes, with yearly accumulating force, until it has become the great channel of colonization of the world. These immigrants are fed from the surplus of their predecessors, and enough is left for shipment to tide-water, to astonish dealers to the great markets of this country and Europe. The amount flowing down the Mississippi is large, but it is eclipsed by that flowing on the Lakes.

The amount exported from New Orleans for the last commercial year, ending 31st August, 1846, was as follows, (see Merchants' Magazine, vol. 15, p. 406:

Flour, 573,194 bbls., or 2,865,970 bushels.	
Corn, 941,589 sacks, or 2,824,767	"
	5,690,739 "

Not knowing the precise quantity in a sack, we have put it at three bushels. The quantity of wheat exported we could not ascertain. There were received 403,786 barrels and sacks. What part of this was converted into flour at New Orleans for home use and for export is not known to us. If we estimate half as exported in wheat, at three bushels the barrel or sack, it would add 605,679 bushels to the above, and show the aggregate of breadstuffs exported from New Orleans to have been equal to 6,296,416 bushels. This was a great increase on the preceding year, but will be very much below the current year.

The uncommon occurrence of high winter prices and good stages of water through the fall and winter, have been highly favorable to that route.

The amount of breadstuffs that reached tide-water by the Erie and Champlain canals, during the last season of navigation, was (see Merchants' Magazine, vol. 16, pp. 191, 192) as follows:

Flour, 3,063,441 bbls.	=15,317,205	bushels
Wheat	2,950,636	"
Corn	1,610,149	"
Amount,	19,877,990	

There were received at Buffalo, by the Lakes:

Flour, 1,374,529 bbls.	=6,872,529	bushels
Wheat	4,744,184	"
Corn	1,455,258	"
Total,	13,075,087	"

From Oswego there was forwarded, by the Canal :

Flour,	471,318 bbls.=	2,355,590	bushels
Wheat . .		433,446	"
Corn . . .		347,747	"
Total,		3,137,783	"

Taking the Lake receipts of Buffalo as the measure of her Canal exports, and adding to them the exports of Oswego, we have nearly the true amount sent to tide-water from the Lakes: 18,209,870 bushels.

Of this amount, 12,284,970 bushels were sent by the small section of the Lake coast embraced by and between Cleveland and Detroit. In a strait line these places are distant from each other but 90 miles, and, following the border of the Lake, but 150 miles. The following table is made up from official sources, and may be relied on for its accuracy. The amount shipped from the harbors of Vermillion and Black River (Charlestown) not being known to us, is not included :

	Flour. *Barrels.*	Wheat. *Bushels.*	Corn. *Bushels.*	Total. *Bushels.*
Detroit,	464,092	114,397	3 768	2,438,635
Monroe,	155,108	272,849	4,804	1,053,387
Eastern Michigan,	619,200	387,244	6,572	3,492,816
Toledo,	164,699	810,063	1,159,312	2,793,720
Lower Sandusky,	1,010	90,000	18,400	113,450
Sandusky City,	51,855	843,746	50,904	1,153,945
Milan,	830	636,141	19,855	660,176
Huron,	–	30,292	–	30,292
Cleveland,	368,355	1,672,340	527,270	4,041,385
Total,	1,205,939	4,470,726	1,784,343	12,284,970

Deducting from the amount received at tide-water,	19,877,990	bushels
The amount shipped through Buffalo and Oswego,	16,209,870	"
There will be left,	3,668,220	"

Of this, some portion came from the Lakes by way of the port of Rochester. We know that several vessels were employed in carrying wheat from the Upper Lakes to that port, but we have not the means of ascertaining the amount.

From these facts it appears that the State of New York furnished less than three and a half millions of bushels of the twenty millions sent to tide-water. The quantity required for consumption up the Champlain canal, in the River towns, and in the city of New York and suburbs, must be much above the amount furnished by the State of New York. Supposing the number in that State, supplied with breadstuffs from the Erie canal, to be 100,000 up the Champlain canal, 200,000 in and through the River towns, and 600,000 in and through the city of New York, and that each person consumes six barrels, there will be a deficiency of nearly two millions of bushels, to be furnished by other States.

But of all the facts relating to this Lake trade, the most striking is, that so large a portion should proceed from so small a section of the Lake coast. The entire extent of Lake coast is some 4,500 miles, much of which has been settled longer than that around the south-western border of Lake Erie; and yet we find the ports of this south-western border of Lake Erie, all situated in a straight line, within 100 miles of Cleveland, ship off more than three-fourths of all the breadstuffs that are sent from the Lakes, through American ports.

	Bushels.
In 1846, Buffalo and Oswego sent forward . . .	16,209,807
Detroit, Monroe, Toledo, Lower Sandusky, Sandusky City, Milan, Huron, and Cleveland, exported . . .	12,294,970
Leaving the export of all the other ports around the Lakes .	3,924,900
Of this there went from Chicago :	
Flour, 19,391 lbs.=	96,945
Wheat	1,358,638
Total,	1,455,583
From Milwaukie : Flour, 15,756 bbls.= . . .	78,780
Wheat	213,448
Corn	1,825
Total,	293,863

Of the balance, Michigan City and St. Josephs sent forward the greatest portion, probably more than three-fourths.

Over three quarters of all the export trade of Lake Michigan is concentrated within a line of 80 miles around its head.

The advantages of the heads of Lakes Erie and Michigan for concentrating the trade of great sections, is worth the study of reflecting and business men.

The Lake exports through Canada have been omitted for want of sufficient data on which to found an accurate estimate.

A correspondent of the Rochester Democrat, at Montreal, has furnished that paper with an abstract of the returns of the flour and grain that has been exported by sea from Montreal and Quebec for the last nine years. Mark the increase :

	Flour. *Barrels.*	Wheat. *Bushels.*	Oats. *Bushels.*	Peas. *Bushels.*
1838,	59,204	–	–	1,415
1839,	48,427	3,336	–	2,855
1840,	315,612	142,059	–	59,878
1841,	356,210	562,862	–	123,574
1842,	294,799	204,107	5,666	78,985
1843,	209,957	144,233	3,651	88,318
1844,	415,467	282,183	24,574	130,355
1845,	442,228	396,252	53,530	220,912
1846,	555,602	434,747	46,060	216,339

AGRICULTURAL MISCELLANY.

METHOD OF DETERMINING THE WEIGHT OF CATTLE.—The following method of ascertaining the dead weight of cattle by measurement when alive, has been adopted to a considerable extent. It is found to be an expeditious mode; and if not to be implicitly depended upon, at least furnishes a very important assistance to the judgment of the dealer.

Rule.—Take the *girth* of the beast by measuring round with a string or tape close behind the shoulder-blade, and the length by measuring from the fore part of the shoulder-blade, along the back, to that bone of the tail which is in a perpendicular line with the hind part of the buttock. Multiply the girth (in feet) by itself, and that product by the length, and then again by 42. The last product, divided by 100, will give the weight in Smithfield stones of 8 lbs. each.* If stones of 14 lbs. are required, the multiplier will be 24 instead of 42.—*Baxter's Library, A. K.*

IMPORTANCE OF THE QUALITY OF THE SALT USED IN MAKING BUTTER.—At a late agricultural meeting in Augusta, Maine, Dr. Bates stated that the farmers in Fairfield were in the habit of buying the best description of salt for butter, and cleansing it, and having it ground, and that this salt they used in the manufacture of butter. The consequence was, the butter made by them had a better reputation and bore a higher price than the butter made in other towns. He held them up as worthy of imitation. He stated that the loss of the butter manufactured in this State was greater in amount every year than the sum raised for the State tax—more than $200,000. He believed that if this fact was generally understood—if the people could be made aware of the loss incurred by bad manufacture—we should at once see an improvement in this article, of which so much is produced, and which enters into our daily consumption.—*Maine Farmer.*

PREPARATION OF SEED WHEAT.—By sieves of suitable size, the largest and best grain may be separated. By washing in water, light seeds of various kinds, and the lightest grain, will swim, and may be skimmed off. By adding salt to

* An English stone is 16 pounds, heavy weight. They have a 14 pounds stone also for light weight, for weighing flax, &c.

the water, which will increase its specific gravity, old imperfect grains, and barley and oats, will rise to the surface. Then it will be well to steep the seed a day or two in salt and water; after which add half a peck of fresh slacked lime to a bushel of grain, mix thoroughly, that every kernel may become coated with lime. Let it remain half a day, or night, after liming, and then sow. The lime and salt are a remedy against smut, as has been proved in numerous cases. We have never known it to fail, though unprepared seed, sown at the time beside the li ed, has been smutty.

Flour and Meal.—The last number of Blackwood's Magazine contains an interesting paper from Professor Johnson, the celebrated Scotch agricultural chemist, upon the comparative substance in coarse and fine flour; and the point he seeks to establish is, that whole meal—or flour containing the whole of the ingredients of the wheat—is not only more healthy, but more profitable than fine flour, from which the bran, &c., is extracted. The gist of his argument is, that there are three ingredients in the human body which need constant nourishment, viz: fat, bone, and muscle. The vegetable food we consume contains three substances almost ready formed. Flour from wheat contains these in larger or smaller proportions, according to quality—less in fine, more in unbolted; and the food must be most wholesome which contains these ingredients most abundantly. The Professor proceeds by a formidable array of analytical demonstrations, to prove how much richer the whole meal is than the fine flour in the three above mentioned essential substances. The following table contains all the facts that are necessary, exhibiting at a view the quantities contained, respectively, in 1000 lbs. of whole meal and fine flour:

	Whole Meal.	Fine Flour.
Muscular matter,	150 lbs.	130 lbs.
Bone material,	170 "	70 "
Fat,	28 "	20 "

"Taking the three ingredients thereof together," says the Professor, "the whole meal is one half more valuable for fulfilling all the purposes of nutrition than the fine flour;" and especially is it so, he adds, to children, to mothers, and to those who undergo much bodily fatigue. "It will not be denied," he argues, "that it is for a wise purpose that the Deity has so intimately associated, in the grain, the several substances which are necessary for the complete nutrition of animal bodies. The above considerations show how unwise we are in attempting to undo this natural collocation of materials. To please the eye and the palate, we sift out a less generally nutritive food; and to make up for what we have removed, experience teaches us to have recourse to animal food of various descriptions."

Kephart's Fruit and Vegetable Preserver.—This is the name of an invention of no little importance to housekeepers and epicures. It consists of a chamber so adapted as to be of a uniform temperature, a degree or so above freezing point, and thus in a condition to preserve not only meat, butter, eggs, but fruits and vegetables of every kind. It has been fully and triumphantly tested. We have seen and tasted apples that have been preserved by them since last December, and the flavor of which was as fresh and rich as if the fruit had been but recently plucked from the tree. So, also, with oranges, lemons, peaches, &c. The patent consists of a proper application of ice, so as to reduce the temperature of a store-room to a condition calculated to insure preservation. The process is simple, and the expense, when the advantage is considered, altogether trifling. Hotel proprietors, boarding-house keepers, and indeed private families, would derive immense advantages from the introduction of one of these preservers into their respective establishments. Professor Johnson has testified to the great utility of the plan, after having noticed the effect on a variety of fruits, vegetables, flowers, and provisions. He says that, by removing the most efficient causes of decomposition, the apparatus secures to every season those delicacies which, ordinarily, can be obtained in perfection only for a very brief period. The advantages are especially apparent in the summer season, when all descriptions of meat are so likely to spoil. Messrs. Flack, Thompson & Co., of Philadelphia, have purchased the patent right for a large portion of the Union, and are now prepared to dispose of privileges, either for districts, states, counties, towns or individuals.—*Philad. Enq.*

The Caoutchouac Trade.—In consequence of the great and constantly increasing demand for caoutchouac, (a corruption of the name given it by the aborigines of Brazil, "cahuchu,") in this country and other parts of Europe, and the United States of North America, from the almost daily uses to which it is found applicable, the attention of the Brazilian Government and Legislature has been called to the necessity of promoting the propagation of the trees from which it is extracted, *seringa elastica.* On this interesting and important subject a memoir has been published by the Brazilian Institution for encouraging agricultural and manufacturing improvements, from which it appears that the extraction of the gum is become so great, that it is no longer procurable in the vicinity of towns or villages in the province of Para, in which the trees are only to be found which yield it, and those principally on the island at the mouth of the rivse Amazon, and on its banks in the interior; so that, at the present moment, a great many heads of families proceed in the proper season into the woods and forests abounding there, without habitation or means of subsisting but from hunting and fishing, and thus lead a wandering and solitary life, until enabled to return to their homes with a sufficient quantity of the gum. Such, however, has been the demand, that it has led to the commission of many frauds, such as filling the paens (loaves or balls) into which it was generally formed, with mud and dirt, so that the purchasers were put to the trouble of opening them, in order to ascertain whether they were imposed on or not, and have been led to prefer it in a plain and transparent state, that they may see it is pure and clean. In 1828, the quantity exported did not exceed 4,000 milreis in value, and 20,000 lbs. in weight; whereas in the last financial year, 1845-6, it amounted to upwards of 800,000 lbs., besides 415, 953 pairs of Shoes—the whole valued at 500,000 milreis! It becomes, therefore, a matter of great consideration for Brazil, not only to preserve this branch of her trade in its present flourishing state, but likewise to be able to augment its production in proportion to its increased consumption; no other branch of its export trade is so profitable, since nothing but manual labor is required, and one man employed in its collection can obtain extract sufficient in one day to make ten pairs of shoes, the current price of which being 300 reis each, gives three milreis per diem, equal at the current exchange to 7s. 6d. a day, which in that cheap country may be considered equivalent to 10s. 6d. in the United Kingdom.—*London Sun.*

Poisonous Bean.—The New Orleans National says that in Mexico there grows a small bean called *Pinon lello,* (pronounced peno-leo,) which, when infused in milk and drank, causes a chronic disease that soon carries off its victims, they the while unconscious of the real cause. This bean, it was said, was used in Havana, many years ago, with considerable success, in destroying the English. The Mexicans use an herb called *Huaco,* (pronounced wha-co,) to relieve them from the poisonous effects of the pinon-lello and the bite of poisonous reptiles, by chewing the weed and swallowing the extract. The extract is also used to put in the place of a bite of a poisonous reptile, and always with success. A Mexican never travels, if it can be avoided, without a small package of the huaco weed.

The Camphor Laurel.—This tree grows in great abundance, and to a very considerable size, in the forests of Japan. It is not uncommon in green-houses in England. Every part of the tree smells strongly of Camphor, which is obtained from the trunk, branches, and roots, by distillation. They are cut down into small pieces, and put into a still with a quantity of water. After the water has been kept boiling forty-eight hours, the Camphor is found to adhere to the straw with which the still is lined. In this state it is imported by the Dutch, and is called crude camphor. It is purified by a second sublimation in glass vessels, being mixed with quick lime, to combine with and prevent any empyreumatic oil with which it may be contaminated from subliming, while the camphor concretes in the upper part of the vessel into cakes, convex on one side and concave on the other, about two or three inches thick, thinner at the edge, and generally perforated in the middle.

A Word to House-keepers.—That delicious and wholesome esculent, the tomato, being now again in season, we desire to inform our readers that the vegetable may be preserved in a variety of ways, so as to be enjoyed when the season for them is over. A writer in the Albany Cultivator mentions one way which he says he has never seen published. The reader can try and test its benefits: "Dip the ripe tomatoes in scalding water, peel them, and divide them into two, or if very thick, three slices; lay them on plates, and put them into the oven after the bread is drawn; if it is a good oven, by the time it is cool, or in forty-eight hours, they will be perfectly dried; put them into paper bags, and keep them in a dry place; when wanted for use, dip them into cold water, and lay them on a dish to swell, and in a mince or stew they are almost equal to the fresh fruit. If you wish to make tomato sauce, add a little water to cook them in. They are very good to eat out of the hand in the dry state."

Difference in the Quality of Milk.—Farmers in general are not aware of the great difference there is in the richness of Milk. In butter dairies especially, this is a point which deserves attention. The mere fact that a cow gives a large quantity of milk is scarcely any evidence of her value for the production of butter. It is but a short time since we heard a farmer state that he had a cow which would give from 20 to 22 quarts per day, and he had till last summer always considered her a first-rate cow; but it then happened that her milk was set separately for butter, when it proved that only about four ounces per day could be obtained. This may be called an extreme case; but let the milk of various cows be fairly tried, and a surprising difference will often be seen.

Fruits.—In the present fruit-eating season, the following historical summary may be acceptable; The apple, in all its innumerable varieties, is said to have been entirely derived from the crab apple, which grows wild in every part of Europe and the United States. The apricot is a fruit of the plum tribe, which grows wild in Armenia, and was introduced into Europe in the 16th century. The peach is a native of Persia, and was introduced into Europe in the year 1562. The pear grows wild in all parts of Europe, and is cultivated in all temperate climates. The culture of the pear is very ancient, and many varieties were known to the ancient Greeks and Romans. At present there are about 200 varieties fit for the table. In the early ages of Greece, the wood of the pear tree was used for statuary, musical instruments, &c.; now it is used for the handles of carpenters' tools, and a variety of mechanical purposes. Plums were first brought from Syria, but are now well known in all temperate climates. Musk-melons were first brought from the southern parts of Asia, and water-melons from Egypt. Black and red currants, and gooseberries and raspberries, grow wild in all parts of Europe and America.

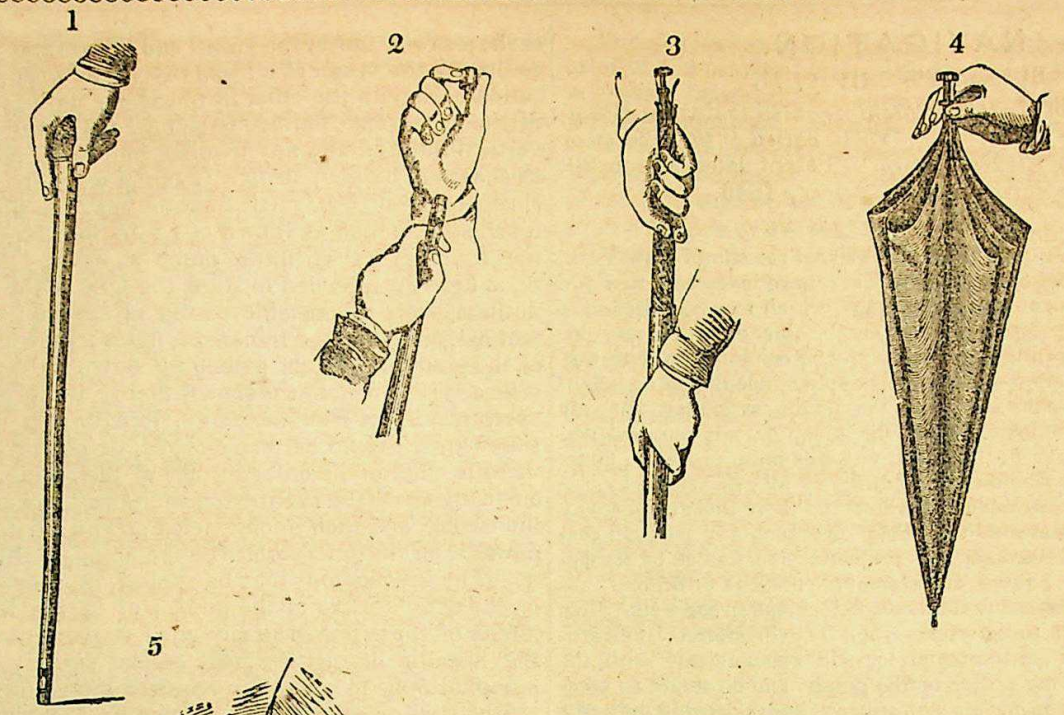
Ripe Fruit and Dysentery.—There is a pernicious prejudice with which people are too generally imbued; it is, that fruits are injurious in the dysentery, that they produce and increase it. There is not, perhaps, a more false prejudice. Bad fruit, and that which is imperfecty ripened, may occasion colics, and sometimes diarrhœa, but never epidemic dysentery. Ripe fruits of all kinds, especially in the summer, are the true preservatives against this malady. The greatest injury they can do is in dissolving the humors, and particularly the bile, of which they are true solvents, and occasion a diarrhœa. But even this diarrhœa, is a protection against the dysentery if it has prevailed. I have ate less animal food and more fruit, and never had the slightest attack. I have seen eleven patients in the same house; nine were obedient to the direction given, and ate fruit; they recovered. The grandmother, and a child she was most partial to, died. She prescribed for the child burnt brandy and oil, powerful aromatics, and forbade the use of fruit. She followed the same course herself, and met the like fate. A minister attacked with dysentery ate three pounds of red currants between seven o'clock in the morning and nine in the evening: next day he was entirely cured.—*Tissot.*

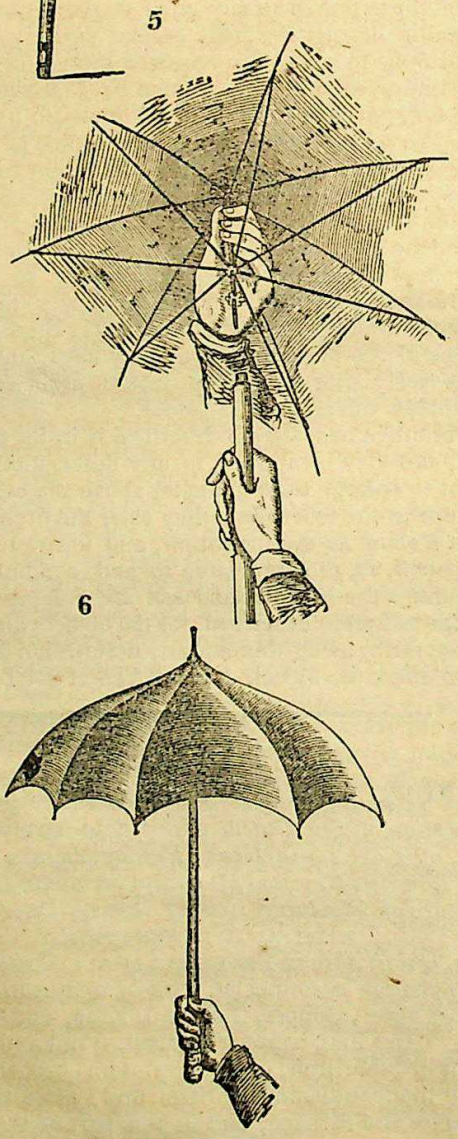
We are indebted to Austria for a recent and happy invention. An individual of that country has thought of using the galvanic power for the preservation of trees and plants. He uses for that purpose two rings—one of copper and the other of zinc. Having placed one upon the other, he fixes them round the trunk of the tree, and if an insect but touch the ring of copper, it receives at once a galvanic shock, by which it is killed, or made to fall. The effect of this apparatus is equally good in dry or wet weather, and its action is unceasing.

To Preserve Green Corn.—Pack the corn down in clean, tight casks, with a pickle sufficiently strong to preserve cucumbers. It should be put down in the husk, and kept secluded from the air by the brine, so as to prevent fermentation or decomposition. Corn so prepared, it is said, will keep for any length of time, and will be sufficiently fresh for the table when boiled.—*Franklin Banner.*

Hydrophobia.—Mr. Youatt, the celebrated veterinary surgeon, in his book on the dog, gives the following advice for the cure of that much dreaded disease hydrophobia. After describing the symptons, explaining the nature and activity of the virus, he says:

"Cauterize the wound thoroughly with *lunar caustic.* Let this, sharpened to a point, be applied thoroughly to every recess and sinuosity of the wound, where the teeth or saliva of the animal could possibly have penetrated. This will form an eschar, hard, dry, and insoluble—a compound of the animal fibre and the caustic, in which the virus is wrapped up, and from which it cannot be separated. In a short time this matter sloughs away, and the virus is carried off with it. Previous to applying the caustic, it will often be necessary to enlarge the wound, that every part may be fairly got at; and after the first eschar has sloughed off, it will be advisable to apply the caustic a second time, to destroy any part that may not have received the full influence of the first operation, or that may possibly have been inoculated more by it. This carefully and thoughtfully done, the patient may feel perfectly safe. The poison will have been entirely removed, and no danger can remain. Mr. Youatt himself has been repeatedly bitten by rabid dogs, and other veterinary surgeons also, but after pursuing the course above recommended, they have felt entirely secure—a confidence justified by the event, as well as by experiments tried on inferior animals. This advice, given not by quacks, but by practitioners of skill and experience, and founded, as will be acknowledged, on reasonable grounds, is worthy to be noted and remembered."





CANE UMBRELLA.

INVENTED BY WARING LATTING, OF N. YORK.

Patented Nov. 21, 1843.

This Umbrella is enclosed in a wooden case, as represented at Fig. 1. At one end of said case is a moveable top of ivory or other suitable material, forming the head. At the bottom end of the case there is attached a brass ferrule, having a projecting point of iron or other metal, with a notch. This point is introduced through an orifice, also composed of metal, into the lower end of the case, and catches upon a corresponding spring, having a nib on the outer side of the cane, which keeps it permanently in its place. The object of said ferrule being to prevent dirt, &c. from penetrating the case, when used in the form of a cane. In order to remove the Umbrella from the case, you first pull off the top (see figs. 2, 3.) and then draw it gradually out. To open the Umbrella, hold it downwards as at fig. 4, and let the point rest on something permanent; then push the runner down on to the rod in the top of the Umbrella, by pressing on a spring attached to said runner. To move the ferrule at the bottom of said case, press your thumb upon the nib of the spring, as at fig. 2. The Umbrella now being removed from the case, you attach it to the bottom end of said case, which now forms the handle, by means of a metallic rod introduced into the before-mentioned orifice; said rod also having corresponding notches to catch against the spring, (see fig. 5.) Fig. 6 represents the Umbrella ready for use.

To detach the Umbrella from the cane, press the finger on the before-mentioned spring at the bottom and pull it off as at fig. 5; then press on the spring of the runner, and close the Umbrella. To fold it, begin at the top, and roll the Umbrella smoothly and tightly to the bottom, where it is fastened by a string; now return it to the case, replace the head and ferrule, and the cane is ready for use as shown at fig. 1.

These Umbrellas, which are a very convenient and compact article, especially for travellers, are now extensively manufactured at the steam Umbrella works of Mr. William H. Richardson, No. 104, Market street, Philadelphia, Pa.

NAVIGATION.

BULKLEY'S SHIP PUMP.

Specification of Letters Patent granted to RALPH BULKLEY, *of the city of New York, called "the Fluted or Transverse Fluted Pump."* Patent dated March 20, 1847; *ante-dated 19th December,* 1846.

WITH AN ILLUSTRATION.

BE it known that I, Ralph Bulkley, of the city of New York, in the county and State of New York, have invented a new and useful improvement in vessel pumps, which may be called "the Fluted or Transverse Fluted Pump." The nature of my invention consists in the application to and combination with vessels' stepped pumps—a vertically applied indentation or indentations on the outer surface of the pump, extending upwards from or near the lower end of the pump to any required distance, about four or five feet, upwards more or less. These indentations may he made by fluting, or by grooves or by battons placed at suitable intervals; and these indentations may extend entirely around the pump, or around any required section of it; and through the projections so formed by fluting, grooving or by battons, transverse indentations or orifices, are to be made sufficient to form a communication for water, from each indentation to the others; and one or more of the vertical indentations are to extend to, and communicate with the lower, or receiving orifice of the pump; and those not so communicating, are to have a stop water at foot; leaving only the horizontal or transverse communications open. Around these transverse fluted indentations downward, in sections, or entire, including the main orifice, is to be applied,—appended thereto, a metallic or other covering, containing small perforations, so that water may pass through into the indentations on the outer surface of the pump to the receiving orifice; so that if the covering at the lower end of the pump should become "choked" or clogged by swelled grain or otherwise, the water would rise upon the pump until it found an entrance into the indentations or transverse flutes; and in the outer canals formed thereby, the water will pass downward unobstructed, into the receiving orifice of the pump. The object of which is to preserve an unobstructed passage for water to the orifice of the pump though the lower end, and lower part of the pump, become choked and clogged with swelled grain or otherwise; a casualty of common occurrence, arising from a variety of causes, by which the pumps, frequently at times most needed, become useless, endangering life and property.

To enable others skilled in the art to make and use my invention, I proceed to describe its construction and operation, reference being had to the annexed drawing, making a part of this specification. Fig. 1, PLATE 3, letter A, represents the lower end of a pump standing in the limbers in a transverse section of a vessel frame, with metallic casing, with suitable perforations or texture to permit water to pass and to prevent grain or other particles from passing to the indentations or perforations in the pump; A A, the pump; B B, the ship's frame and step-chamber for the pump; C C, the metallic casing extending upward about four feet more or less. This casing may be applied entire as shown at C C, or in sections; or they may be made a suitable fit to the step-chamber and extended up any required distance upon the side or circumference of the pump and secured by clamps, bands or screws in such a manner that they can be taken off at pleasure for repairs of pumps; D D, the cap piece of metal or other substance. The fluting or grooves within the casing may be made vertically about two inches broad, and about one inch in depth, more or less; and one or more of them are to extend downward, so as to form a communication with the receiving orifice of the pump. The other flutes are to contain, each, a stop water at the lower end, near and above the ceiling of the vessel at B; and to have an open communication each with the other by transverse flutings—one line of the transverse flutings to be near the lower end of the vertical flutings, and any required number of others above as shown at o o o o, in fig. 1, pump W. The tongue or space between the vertical flutes may be about three-fourths of an inch as shown at I I, in the transverse section fig. 2, and at I I in the pump W, fig. 1. This pump W, at fig. 1, is intended to show the form of the transverse flutings before the metallic casing is applied; H H H, the vertical, and o o o the transverse flutes; showing one flute or indentation only, as extending down to the receiving orifice K; by which it is shown that if any portion of the apertures, in the metallic casing, from the step of the pump K upwards, should become clogged, or obstructed by particles resting on the outer surface of the casing, the water on rising above the obstruction would pass inward through the casing, and then unobstructed downward through the flutings, on the outer surface of the pump, to the receiving K. The indentations may be applied, as above described, on the outer surface of the pump; or in the form of the thread of the screw or in any other convenient form; and the metallic casing C C may extend entirely around the pump, or only to cover any required section of it.

This improvement, "the Fluted or Transverse Fluted Pump," is believed to differ from all others in use. It preserves a free passage for water to the orifice of the pump, though the step-chamber around the pump between the ceiling plank and outside plank should become entirely choked or clogged with swelled grain or otherwise, so as to render the pump entirely useless except through the fluted entrances herein described, which may be so applied as to present a protected surface for water to enter the pump more than a hundred times greater than the ordinary surface of the pump orifice as now used, and to let in water as freely after the pump would otherwise become choked below the ceiling, as before.

The improvement herein described is in its nature permanent, and may be applied to any description of pumps so as not to enlarge their diameter above the ceiling of the vessel, nor at the foot where they enter the limbers.

What I claim as my invention, and desire to secure by letters patent, is, the applicaton to and combination with vessel pumps the indentations and appendages connected therewith as herein described, for the objects and purposes herein set forth, using therefor any description of materials that will effect the object. RALPH BULKLEY.

METALLURGY.

MANUFACTURE OF STEEL, COPPER, &c.

Specification of the Patent granted to ARTHUR WALL, Esq., *of East India Road, Poplar, county of Middlesex, London, Surgeon, for improvements in the manufacture of Steel and Copper.* Sealed Dec. 18, 1845.

WITH AN ILLUSTRATION.

TO ALL WHOM THESE PRESENTS SHALL COME, &c.—

My invention is connected with or relates to the manufacture of Steel, Copper, Tin and Zinc, and their compounds. And first, as regards Steel, I take the bars of wrought or other iron, of a description properly fit and suited to the manufacture of Steel, and I place them in the usual boxes and furnace, and in this part of the process I

employ the same means and the same apparatus as are in known use under the denomination of a converting furnace. The bars of iron so intended for conversion are imbedded in charcoal of the ordinary description, or in the carbonaceous substances in general and customary use. Or I take of charcoal of the ordinary description six parts to three parts of chalk of the ordinary description, and to each volume or quantity of one bushel in measure of the charcoal and chalk, taken in such proportions and finely powdered, I add one or two pounds of zinc filings; I lay or spread the mixture on the bottom of the converting chamber, or I place them in a retort of due and proper capacity, properly set for fire, and a fire made sufficient to drive off the carbonic acid. The carbonic oxide thus generated is then directed upon the chamber in which the iron under process of conversion is placed, and such direction is continued during the time required for the conversion. Having thus prepared the carbonaceous bed in which the bars of iron intended for the process of conversion into steel are laid and enclosed, as in the modes and arrangements usually adopted, I next make the necessary arrangement, as hereinafter described, for the transmission of a continuous current or stream of electricity through the bars; and I continue such transmission during twelve or fourteen consecutive hours, or during a longer time, if a longer time be necessary, for the conversion of the iron into steel. This process of transmission of the electric current or stream is made through each of the bars in succession, or through the whole of them simultaneously or together,—the object being to transmit such electrical current through the bars antecedent to and during their conversion into steel. I effect such transmission by attaching an iron, copper, or other suitable metallic bar or wire to the extremities of the polar bars respectively, as hereinafter described, and then bringing the extremities of such wires out of the furnace, so that, at the proper time, a connexion may be made between such wires and those forming the poles or conductors of a voltaic apparatus or pile, and in this way the electric circuit is so completed that such electric current or stream may be made as aforesaid to traverse the bars during a longer or shorter time. In practice, I commence the process of transmitting the electricity when the bars have become of a red heat in the furnace, and I continue the process of so transmitting the electricity until one of the pole bars, to which the battery is attached, is, by examination, found to exhibit the proper indications of a perfect conversion. Now, although in practice I prefer to use as a source of the electricity required in these aforesaid processes that form of galvanic battery, or apparatus, commonly known under the denomination of Smee's battery, yet I would have it understood that I find any other source or modification of electricity of adequate power may be used with equal effect.

The aforesaid process is equally applicable to blistered steel and cast steel; and when applied to cast steel the process is the same as that used in the electrization of any common bar of cast iron, as has already been described by me in the specification of certain letters patent for "Certain improvements in the manufacture of Iron," granted to me, and bearing date at Westminster, 18th Nov., 1843.

The practical object being to subject such metal to the action and effect of an electric current or stream, while it is in fusion or in the stage of setting, and to a greater or lesser extent during the term of its cooling down to the usual temperature of the atmosphere.

For producing the proper and effective conversion of steel in the process hereinafter described, I use a galvanic or voltaic battery, of the dimensions and arrangements as hereinafter stated. I construct a Smee's or other galvanic or voltaic battery, consisting of about 30,000 superficial inches of surface or area, and apply it for the conversion of each 12 tons of bar metal, and in the construction of such a Smee's or other battery for such purpose, the mode of arranging this quantity of superficial surface, which I find in practice the most commodious and effective, is to make each pair of plates of such battery to contain an acting surface of 300 superficial inches under the dimensions for each plate of 10 inches by 5 inches.

After having laid or spread the first stratum of carbonaceous matter in the converting chamber, as herein before described, I arrange the bars of metal to be operated upon in the following manner and order (that is to say) as such bars are represented in the accompanying drawing. Fig. 1 (PLATE III) represents a plan view of such arrangement, and Fig. 2 a perspective view of several such horizontal arrangements placed over each other; the corresponding bars and supporting pieces in each of those figures being marked respectively with the same letter of reference, in as far as such the said bars and supporting pieces can be seen in those views. In Fig. 1, A, B, C, D, &c. represent a range of supporting pieces or blocks, and H, I, K, L, &c. an opposite range of similar pieces or blocks. In and between such supporting pieces or blocks of the respective range, I arrange the bars of metal to be submitted to the process herein before described, in the order and manner of arrangement shown in the Figs. 1 and 2 respectively, the bars of metal being marked respectively *a*, *b*, *c*, *d*, &c.

The figure 2 represents a mode of arranging the ranges of the bars of metal by super-position, which I find convenient and effective in practice. The lower range represented in figure 2, at Q, T, shows in elevation the range Q, T, represented in figure 1 in plan. The range represented in figure 2 at R, U, shows a second range of similar horizontal arrangement to that shown in figure 1; and in super-position to the first, the range represented in figure 2, at S, V, shows a third range again, super-posed upon the second range, R, U, and I continue such ranges to any convenient extent or number of ranges. A pole bar, *x*, *x*, and a trial bar, *y*, *y*, is placed at each extremity of the ranges, and the ranges connected, as shown in the drawing at *z*, *z*. The whole of the interstical spaces or openings remaining between the supporting pieces or blocks, A, B, C, D, must be filled up with refractory fire-clay to the level of the upper side or surface of each such block. A horizontal layer, or stratum of the same, of about half an inch in thickness, is then laid upon the upper surfaces of the aforesaid pieces or blocks; and upon each such stratum so laid, the second range of pieces or blocks, as before described, are then arranged. The interstical openings between the bars of metal under conversion are then to be entirely filled up with finely powdered charcoal or coke, mixed with finely pounded chalk, in the proportion of six parts of charcoal or coke to two or three parts of chalk. This mode of filling the interstical spaces between the bars of metal to be converted, I employ for the lower range of such bars; the interstical spaces between such bars, in all the upper or super-posed ranges, I fill with pounded charcoal or coke alone. In applying my said invention to the other metals herein before mentioned, that is to say, to copper, tin and zinc, I subject the metals

whilst in a fluid state, and also whilst in the act of congealing or solidification, to a current of electricity, which I cause to traverse as completely as possible throughout the entire mass. The arrangements which I employ for that purpose are the same as those already described with reference to cast iron, in the specification of letters patent granted to me for "Certain improvements in the manufacture of Iron," 18th November, 1843, with this exception only, that in applying the electricity to copper, tin and zinc, the connecting wire must be of platinum.

Having thus described his invention, Mr. Wall claims the improvement in the manufacture of Steel, Copper and other metals, and their compounds and other metals, by subjecting them while in a melting state; and in the process of solidification, to the influence of electricity as herein before described.—*London Repertory.*

BOOK TABLE.

Notices of Valuable Works on the Arts and Sciences.

AMERICAN DRAWING-BOOK. By JOHN G. CHAPMAN, N. A.—New York: *J. S. Redfield*, Clinton Hall.

As a specimen of the arts this drawing-book cannot be surpassed. As an elementary work, it is undoubtedly the best extant. It is intended as well for home instruction as for the use of schools, and fills a vacuum long desired in the primary department of the arts. Both the author and publisher merit a liberal patronage for the manner in which they have executed their several departments. Price 75 cents per number.

DESIGNS FOR COTTAGES. By T. U. WALTER & J. JAY SMITH. Philad.: *Carey & Hart.*

This is one of the most beautiful works of architecture ever issued from the American press. Comprising almost every style, for villas and cottage architecture, accompanied with ground-plans, instructions, &c., &c. Price, $10.

DESIGNS FOR WORKERS IN METALS AND STONE.—Same editors and publishers.

The subject of Iron railing, &c., seems here exhausted; it embraces all the known or conceivable patterns, as well as marble mantels, monuments and designs in arabesque, &c.—a work indispensable to the architect, engineer, iron founder, draughtsman and mechanic generally.

JOHNSON'S DICTIONARY OF GARDENING—"A Dictionary of Modern Gardening, by George W. Johnson, author of the principles of Practical Gardening," &c. Edited, with numerous additions, by David Landreth, of Philadelphia.—Philadelphia: Lea & Blanchard publishers.

This work contains about six hundred illustrated pages, filled with a vast amount of information upon every subject of interest to gardeners, florists, &c., to whom it is a volume of eminent value, and will no doubt become a standard work in that department of the sciences.

FARMERS' LIBRARY AND MONTHLY JOURNAL OF AGRICULTURE. Edited by JOHN S. SKINNER.—New York: *Greely & McElrath.*

Those who are desirous of possessing themselves of invaluable works on the subject of agriculture, we would refer them to Mr. Skinner's Journal, who continues to gain for himself the richest laurels, for the sound judgment he exercises in bringing to light all that is new or available in his department of the sciences.

ANIMAL CHEMISTRY AND CHEMISTRY IN ITS APPLICATION TO AGRICULTURE. By FRANCIS LIEBER.—New York: *Henry Kerrnot*, 633 Broadway. Price 25 cents.

THE HORTICULTURIST. Edited by A. J. DOWNING.—New York: *M. H. Newman & Co.*

A monthly publication, filled with useful information upon horticulture, and every thing connected with that delightful occupation, the cultivation of flowers and shrubs.

DOWNING'S FRUIT TREES OF AMERICA, &c.—Price, $1 50
" GARDENING FOR LADIES, " 1 25
" DESIGNS FOR COTTAGES, &c. " 2 00
" LANDSCAPE GARDENING, &c. " 3 50
New York: *Wiley & Putnam.*

PERFUMERY: Its manufacture and use. By CAMPBELL MORFIT.—Philad.: *Cary & Hart.*

This work contains receipts for all the fashionable preparations of the day in this department, and will be found of practical value as a manual, not only to the perfumer, but to the druggist and soap manufacturer.

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NEW YORK. JOHN HANCOCK, EDITOR.

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Bedstead Fastenings, improvement in, by Joseph W. Adams, Boston, Massachusetts, - Sept. 10, 1846

Cooking Stoves, improvement in, by William H. Allen, Wellsburg, Virginia, and James Slocum, Brownsville, Pennsylvania, - - - Sept. 10, 1846

Sewing Machines, improvement in, by Elias Howe, jr., Cambridge, Massachusetts, - - Sept. 10, 1846

Ditching Machines, improvement in, by Samuel Thrailkill, Lafayette, Indiana, - - Sept. 10, 1846

Spark Arresters, improvement in, by Augustus Harnan, Washington City, - - Sept. 10, 1846

Artificial Millstones, improvement in, by Ezekiel Cutter and Stephen Blanchard, Cincinnati, Ohio, - Sept. 10, 1846

Curing Meat, &c., improvement in, by Augustus C. Allen, Houston, Texas, - - Sept. 12, 1846

Artificial Stones for grinding, improvement in, by Josse Fitzgerald, New York, - - Sept. 12, 1846

Printing Presses, improvement in, by William W. Marston, New York, - - Sept. 12, 1846

Platform Balances, improvement in, by Joshua Gibbs, Newark, Ohio, - - - Sept. 12, 1846

Bolting Flour, improvement in, by Edward Bradfield, Rochester, New York, - - Sept. 15, 1846

Coffer Dams, improvement in, by Samuel S. Wallery, Charlestown, Pennsylvania, - - Sept. 15, 1846

Blacksmiths' Forges, improvement in, by James R. Hobbs, Huntsville, Alabama, - - Sept. 15, 1846

Steelyards, improvement in, by Thaddeus Fairbanks, St. Johnbury, Vermont, - - Sept. 15, 1846

Cultivators, improvement in, by Isaac Edwards, Paoli, Ia. Sept. 19, 1346

Bee Hives, improvement in, by William Whitcomb, Grafton, Vermont, - - Sept. 19, 1846

Whaling Lances, improvement in, by Oliver Allen, Norwich, Connecticut, - - Sept. 19, 1946

Double Cylinder Steam Engines, improvement in, by Daniel Barhum, New York, - - Sept. 19, 1846

Straw Cutters, improvement in, by Isaac Mayfield, Elkton, Kentucky, - - - Sept. 19, 1846

Fire Engines, improvement in, by Gardner Barton and Lysander Button, Waterford, New York, - Sept. 19, 1846

Machinery for double Seaming, improvement in, by George R. Moore, Philadelphia, Pennsylvania, Sept. 19, 1846
Self-acting Tail Block, improvement in, by Henry Mellish, Drewsville, New Hampshire, Sept. 19, 1846
Glass Furnaces, improvement in, by Thomas Leighton, Cambridge, Massachusetts, Sept. 19, 1846
Cooking Stoves, improvement in, by Jacob Cornelison, Danville, Pennsylvania, Sept. 26, 1846
Machinery for rolling Hoop Iron, improvement in, by Benjamin Norton, Boonton, New Jersey, Sept. 26, 1846
Hames for Harness, improvement in, by Kasson Frazer, Fayetteville, New York, Sept. 26, 1846
Kiln Drying Grain, improvement in, by William W. Alcott, Boston, Massachusetts, Sept. 26, 1846
Carriage Brakes, improvement in, by Elijah Chapman, Akron, Ohio, Sept. 26, 1846
Rotary Engines, improvement in, by James Miller, Philadelphia, Pennsylvania, Sept. 26, 1846
Kiln Drying Grain, improvement in, by Selbre Howard, Adrian, Michigan, Sept. 26, 1846
Carding Machines, improvement in, by Charles Bishop, Newton, Connecticut, October 3, 1846
Self-acting Mules, improvement in, by William Mason, Taunton, Massachusetts, October 3, 1846
Straw Cutters, improvement in, by James F. Wade, Augusta, Georgia, October 3, 1846
Steam Pistons, improvement in, by James Richards, New York, October 3, 1846
Ribbon Looms, improvement in, by Cailv. Ganahl, Innsbruck, Austria, October 3, 1846
Glass Furnaces, improvement in, by Deming Jawes, Boston, Massachusetts, October 3, 1846
Threshing Machines, improvement in, by William Eddy, Easton, and John A. Eaplin, Fishkill, New York, October 3, 1846
Cooking Stoves, improvement in, by Adam C. Conde, Schenectady, New York, October 3, 1846
Glass Lenses, improvement in, by Henry M. Paine, North Oxford, Massachusetts, October 3, 1846
Lath Cutting Machines, improvement in, by James M. Winslow, Campbellport, Ohio, October 3, 1846
Neck Stocks, improvement in, by Charles Fanshaw, New York, October 3, 1846
Manufacture of Gas, improvement in the, by George Michiels, Paris, France, October 3, 1846
Making Sugar, improvement in, by George Michiels, Island of Gaudaloupe, October 3, 1846
Clocks, improvement in, by John M. Schrock, Millersburg and John P. Fisher, Quincy, Illinois, October 3, 1846
Fruit Gatherers, improvement in, by William Sedgwick and John Bookes, Poughkeepsie, New York, October 3, 1846
Boot Crumps, improvement in, by William Taylor, Berlin, New York, October 3, 1846
Straw Cutters, improvement in, by William J. Rylander, Columbus, Georgia, October 3, 1846
Carriage Steps, improvement in, by David and Ezais Z. Little, Gettysburg, Pennsylvania, October 7, 1846
Fire Engines, improvement in, by Charles W. Grannis, Collins, New York, October 7, 1846
Tempering Furnaces, improvement in, by William H. Passmore, North Wayne, Maine, October 7, 1846
Apparatus for constructing Cisterns, improvement in, by Orlando Owen, Burlington, Vermont, October 7, 1846
Washing Machines, improvement in, by H. B. Masser, Sunbury, Pennsylvania, October 7, 1846
Gas Engines, improvement in, by Stuart Perry, New York, October 7, 1846
Fireplace Grates, improvement in, by John Goldenburg, Cincinnati, Ohio, October 7, 1846
Couplings for Railroad Cars, improvement in, by James A. Cutting and George Butterfield, Boston, Mass., October 7, 1846
Making Moulds for Castings, improvement in, by Francis N. Still, Buffalo, New York, October 7, 1846
Cooking Stoves, improvement in, by William B. Treadwell, Albany, New York, October 7, 1846
Corn Shellers, improvement in, by James Murray, Baltimore, Maryland, Oetober 7, 1846
Corn Shellers, improvement in, by Jonathan W. Gordon, Jamestown, North Carolina, October 7, 1846
Lightning Conductors, improvement in, by Rene L. Anglois, Assumption, Louisiana, October 7, 1846
Lanterns for destroying Insects, improvement in, by Samuel C. Wilt, Hartleton, Pennsylvania, October 7, 1846
Carriage Axles, improvement in, by Isaac Slack, Avondale, Pennsylvania, October 10, 1846
Windlasses, improvement in, by Harvey W. Sabin, Rushville, New York, October 10, 1846
Stoves, improvement in, by Charles H. Rogers and Samuel H. Hancox, Troy, New York, October 10, 1846
Locomotive Carriages, improvement in, by Ross Winans, Baltimore, Maryland, October 14, 1846
Preparing Grain for Flouring, improvement in, by J. W. Howlett and F. M. Walker, Greecsboro, N. Carolina, October 14, 1846
Machinery for trimming Brushes, improvement in, by Benjamin Babbitt, New York, October 14, 1846
Threshing Machines, improvement in, by Clinton Foster and Levi Jones, Laporte, Indiana, October 17, 1846
Bell Machinery for Hotels, improvement in, by Timothy D. Jackson and Alfred Judson, Rochester, N. York, October 17, 1846
Cotton Gins, improvement in, by Peter Von Schmidt, Washington City, October 17, 1846
Hay and Cotton Presses, improvement in, by Nicholas Lampton, Cocksaxie, New York, October 17, 1846
Feeding Apparatus for Saw Mills, improvement in, by Nathan Compton, New Garden, Indiana, October 21, 1846
Steam Engines, improvement in, by Nathan N. Barlow, Homer, New York, October 21, 1846
Machinery for dressing Cloth, improvement in, by Josiah C. Carlisle, Armagh, Pennsylvania, October 21, 1846
Manufacture of Steel, improvement in, by Josiah M. Heath, London, England, October 24, 1846
Pumps for raising water, improvement in, by David Hinman, Brunswick, Ohio, October 24, 1846
Filtering Stop Cocks, improvement in, by William Read, New York, October 24, 1846
Pessaries, improvement in, by Joel B. Merriman, Sheffield, Massachusetts, October 24, 1846
Boilers for heating Liquid, improvement in, by Warren Nims, Fort Ann, New York, October 24, 1846
Railroad Cars, improvement in, by William C. Fuller, England, October 24, 1846
Detaching horses from Carriages, improvement in, by H. C. Wiatt, Weldon, North Carolina, October 29, 1846
Boring and cutting Screws on Bedsteads, improvement in, by Joseph Guild, Cincinnati, Ohio, October 29, 1846
Cooking Ranges, improvement in, by Moses Pond, Boston, Massachusetts, October 29, 1846
Tailors' Measures, improvement in, by Benjamin C. Martin, Richmond, Virginia, October 29, 1846
Piano Fortes, improvement in, by John Schriber, New York, October 29, 1846
Seed Planters, improvement in, by Henry W. Smith, Paradise, Pennsylvania, Nov. 4, 1846
Artificial Legs, improvement in, by Benjamin F. Palmer, Meredith, New Hampshire, Nov. 4, 1846
Machines for cleaning Chimneys, improvement in, by James Slaughter, Strasburg, Pennsylvania, Nov. 4, 1846
Shower Baths, improvement in, by Horace Wells, Hartford, Connecticut, Nov. 4, 1846
Bridges, improvement in, by Lowman Gay, Chili, New York, Nov. 4, 1846
Printing in Colors, improvement in, by A. D. McKinzie, Philadelphia, Pennsylvania, Nov. 4, 1846
Pen and Pencil Cases, improvement in, by Jacob J. Hatcher, Philadelphia, Pennsylvania, Nov. 4, 1846
Ever-pointed Pencils, improvement in, by Albert G. Bagley, New York, Nov. 4, 1846
Machinery for making Goods for Cap Spinners, improvement in, by William Cundell, Paterson, New Jersey, Nov. 10, 1846
Dry Docks, improvement in, by Hugh K. Wagner, St. Louis, Missouri, Nov. 10, 1846
Tide Mills; improvement in, by Thomas Rowand, Philadelphia, Pennsylvania, Nov. 10, 1846
Water Wheels, improvement in, by Hiram Munger, Chicopee, Massachusetts, Nov. 10, 1846
Water Wheels, improvement in, by Theodore R. Timby, Cato Four Corners, New York, Nov. 10, 1846
Rotary Shears, improvement in, by Loomis and Lockwood J. Lamb, Berlin, Connecticut, Nov. 10, 1846
Drawing Frames, improvement in, by Joseph Pray and C. Stafford, East Kinlingly, Connecticut, Nov. 12, 1846
Surgical Operations, improvement in, by Charles T. Jackson and Wm. T. G. Morton, Boston, Mass., Nov. 12, 1846
Coffee Roasters, improvement in, by James W. Carter, Boston, Massachusetts, Nov. 12, 1846
Washing Machines, improvement in, by Ira Avery, Tunkhannock, Pennsylvania, Nov. 14, 1846
Handling Hides, improvement in, by Augustus H. Beschormann, New York, Nov. 14, 1846
Cider Mills, improvement in, by George W. D. Culp, Allentown, Indiana, Nov. 14, 1846
Water Wheels, improvement in, by Elisha Hale, Newark, New Jersey, Nov. 14, 1846
Twyere, improvement in, by Melvin McKay, Lyons, New York, Nov. 14, 1846

APPENDIX.

PATENT LAWS.

AN ACT to promote the progress of Useful Arts, and to repeal all acts and parts of acts heretofore made for that purpose.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress Assembled, That there shall be established and attached to the Department of State an office to be denominated the Patent Office, the chief officer of which shall be called the Commissioner of Patents, to be appointed by the President, by and with the advice and consent of the Senate, whose duty it shall be, under the direction of the Secretary of State, to superintend, execute, and perform all such acts and things, touching and respecting the granting and issuing of patents for new and useful discoveries, inventions and improvements, as are herein provided for, or shall hereafter be, by law, directed to be done and performed, and shall have charge and custody of all the books, records, papers, models, machines, and all other things belonging to said office. And said Commissioner shall receive the same compensation as is allowed by law to the Commissioner of the Indian Department, and shall be entitled to send and receive letters and packages by mail, relating to the business of the office, free of postage.

SEC. 2. *And be it further enacted*, That there shall be in said office an inferior officer, to be appointed by the said principal officer, with the approval of the Secretary of State, to receive an annual salary of seventeen hundred dollars, and to be called the Chief Clerk of the Patent Office, who, in all cases during the necessary absence of the Commissioner, or when the said principal office shall become vacant, shall have the charge and custody of the seal, and of the records, books, papers, machines, models, and all other things belonging to the said office, and shall perform the duties of Commissioner during such vacancy. And the said Commissioner may also, with like approval, appoint an examining clerk, at an annual salary of fifteen hundred dollars; two other clerks, at twelve hundred dollars each, one of whom shall be a competent draughtsman; one other clerk, at one thousand dollars; a machinist, at twelve hundred and fifty dollars; and a messenger, at seven hundred dollars. And said Commissioner, clerks, and every other person appointed and employed in said office, shall be disqualified and interdicted from acquiring or taking, except by inheritance, during the period for which they shall hold their appointments, respectively, any right or interest, directly or indirectly, in any patent for an invention or discovery which has been, or may hereafter be, granted.

SEC. 3. *And be it further enacted*, That the said principal officer, and every other person to be appointed in the said office, shall, before he enters upon the duties of his office or appointment, make oath or affirmation truly and faithfully to execute the trust committed to him. And the said Commissioner and the Chief Clerk shall also, before entering upon their duties, severally give bonds, with sureties, to the Treasurer of the United States, the former in the sum of ten thousand dollars, and the latter in the sum of five thousand dollars, with condition to render a true and faithful account to him or his successor in office, quarterly, of all moneys which shall be by them respectively received for duties on patents, and for copies of records and drawings, and all other moneys received by virtue of said office.

SEC. 4. *And be it further enacted*, That the said Commissioner shall cause a seal to be made and provided for the said office, with such device as the President of the United States shall approve; and copies of any records, books, papers, or drawings, belonging to the said office, under the signature of the said Commissioner, or, when the office shall be vacant, under the signature of the Chief Clerk, with the said seal affixed, shall be competent evidence in all cases in which the original records, books, papers, or drawings, could be evidence. And any person making application therefor may have certified copies of the records, drawings, and other papers deposited in said office, on paying, for the written copies, the sum of ten cents for every page of one hundred words; and for copies of drawings, the reasonable expense of making the same.

SEC. 5. *And be it further enacted*, That all patents issuing from said office shall be issued in the name of the United States, and under the seal of said office, and be signed by the Secretary of State, and countersigned by the Commissioner of said office, and shall be recorded, together with the descriptions, specifications, and drawings, in the said office, in books to be kept for that purpose. Every such patent shall contain a short description or title of the invention or discovery, correctly indicating its nature and design, and in its terms grant to the applicant or applicants, his or their heirs, administrators, executors or assigns, for a term not exceeding fourteen years, the full and exclusive right and liberty of making, using, and vending to others to be used, the said invention or discovery, referring to the specifications for the particulars thereof, a copy of which shall be annexed to the patent, specifying what the patentee claims as his invention or discovery.

SEC. 6. *And be it further enacted*, That any person or persons having discovered or invented any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement on any art, machine, manufacture, or composition of matter, not known or used by others before his or their discovery or invention thereof, and not, at the time of his application for a patent, in public use or on sale, with his consent or allowance, as the inventor or discoverer, and shall desire to obtain an exclusive property therein, may make application, in writing, to the Commissioner of patents, expressing such desire, and the Commissioner, on due proceedings had, may grant a patent therefor. But before any inventor shall receive a patent for any such new invention or discovery, he shall deliver a written description of his invention or discovery, and of the manner and process of making, constructing, using, and compounding the same, in such full, clear, and exact terms, avoiding unnecessary prolixity, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound and use the same; and in case of any machine, he shall fully explain the principle, and the several modes in which he has contemplated the application of that principle or character by which it may be distinguished from other inventions; and shall particularly specify and point out the part, improvement, or combination, which he claims as his own invention or discovery. He shall, furthermore, accompany the whole with a drawing or drawings, and written references, where the nature of the case admits of drawings; or with specimens of ingredients, and of the composition of matter, sufficient in quantity for the purpose of experiment, where the invention or discovery is of a composition of matter; which descriptions and drawings, signed by the inventor, and attested by two witnesses, shall be filed in the Patent Office; and he shall, moreover, furnish a model of his invention, in all cases which admit of a representation by model, of a convenient size to exhibit advantageously its several parts. The applicant shall also make oath, or affirmation, that he does verily believe that he is the original and first inventor or discoverer of the art, machine, composition, or improvement, for which he solicits a patent; and that he does not know or believe that the same was ever before known or used; and also of what country he is a citizen: which oath or affirmation may be made before any person authorized by law to administer oaths.

SEC. 7. *And be it further enacted*, That on the filing of any such application, description, and specification, and the payment of the duty hereinafter provided, the Commissioner shall make, or cause to be made, an examination of the alleged new invention or discovery; and if, on any such examination, it shall not appear to the Commissioner that the same had been invented or discovered by any other person in this country, prior to the alleged invention or discovery thereof by the applicant, or that it had been patented or described in any printed publication in this or any foreign country, or had been in public use or on sale, with the applicant's consent or allowance, prior to the application, if the Commissooner shall deem it to be sufficiently useful and important, it shall be his diuty to issue a patent therefor. But whenever, on such examination, it shall appear to the Commissioner that the applicant was not the original and first inventor or discoverer thereof, or that any part of that which is claimed as new had before been invented or discovered, or patented, or described in any printed publication in this or any foreign country as aforesaid, or that the description is defective and insufficient, he shall notify the applicant thereof, giving him briefly such information and references as may be useful in judging of the propriety of renewing his application, or of altering his specification to embrace only that part of the invention or discovery which is new. In every such case, if the applicant shall elect to withdraw his application, relinquishing his claim to the model, he shall be entitled to receive back twenty dollars, part of the duty required by this act, on filing a notice in writing of such election in the Patent Office; a copy of which, certified by the Commissioner, shall be a sufficient warrant to the Treasurer for paying back to the said applicant the said sum of twenty dollars. But if the applicant, in such case, shall persist in his claims for a patent, with or without any alteration of his specification, he shall be required to make oath or affirmation anew, in manner as aforesaid; and if the specification and claim shall not have been so modified as, in the opinion of the Commissioner, shall entitle the applicant to a patent, he may, on appeal, and upon request in writing, have the decision of a board of examiners, to be composed of three disinterested persons, who shall be appointed for that purpose by the Secretary of State, one of whom, at least, to be selected, if practicable and convenient, for his knowledge and skill in the particular art, manufacture, or branch of science to which the alleged invention appertains; who shall be under oath or affirmation for the faithful and impartial performance of the duty imposed upon them by said appointment. Said board shall be furnished with a certificate in writing of the opinion and decision of the Commissioner, stating the particular grounds of his objection, and the part or parts of the invention which he considers as not entitled to be patented.

And the said board shall give reasonable notice to the applicant, as well as to the Commissioner, of the time and place of their meeting, that they may have an opportunity of furnishing them with such facts and evidence as they may deem necessary to a just decision; and it shall be the duty of the Commissioner to furnish to the board of examiners such information as he may possess relative to the matter under their consideration. And on an examination and consideration of the matter by such board, it shall be in their power, or of a majority of them, to reverse the decision of the Commissioner, either in whole or in part; and their opinion being certified to the Commissioner, he shall be governed thereby in the further proceedings to be had on such application: *Provided, however*, That, before a board shall be instituted in any such case, the applicant shall pay to the credit of the Treasury, as provided in the ninth section of this act, the sum of twenty-five dollars; and each of said persons so appointed shall be entitled to receive, for his services in each case, a sum not exceeding ten dollars, to be determined and paid by the Commissioner out of any moneys in his hands, which shall be in full compensation to the persons who may be so appointed, for their examination and certificate as aforesaid.

Sec. 8. *And be it further enacted*, That whenever an application shall be made for a patent, which, in the opinion of the Commissioner, would interfere with any other patent for which an application may be pending, or with any unexpired patent which shall have been granted, it shall be the duty of the Commissioner to give notice thereof to such applicants, or patentees, as the case may be; and if either shall be dissatisfied with the decision of the Commissioner on the question of priority of right or invention, on a hearing thereof, he may appeal from such decision, on the like terms and conditions as are provided in the preceding section of this act, and the like proceedings shall be had, to determine which, or whether either, of the applicants is entitled to receive a patent as prayed for. But nothing in this act contained shall be construed to deprive an original and true inventor of the right to a patent for his invention, by reason of his having previously taken out letters patent therefor in a foreign country, and the same having been published, at any time within six months next preceding the filing of his specification and drawings. And whenever the applicant shall request it, the patent shall take date from the time of filing of the specifications and drawings, not, however, exceeding six months prior to the actual issuing of the patent; and on like request, and the payment of the duty herein required, by any applicant, his specification and drawings shall be filed in the secret archives of the office, until he shall furnish the model, and the patent be issued, not exceeding the term of one year—the applicant being entitled to notice of interfering applications.

Sec. 9. *And be it further enacted*, That, before any application for a patent shall be considered by the Commissioner as aforesaid, the applicant shall pay into the Treasury of the United States, or into the Patent Office, or into any of the deposite banks, to the credit of the Treasury, if he be a citizen in the United States, or an alien, and shall have been resident in the United States for one year next preceding, and shall have made oath of his intention to become a citizen thereof, the sum of thirty dollars; if a subject of the King of Great Britain, the sum of five hundred dollars, and all other persons the sum of three hundred dollars; for which payment duplicate receipts shall be taken, one of which to be filed in the office of the Treasurer. And the moneys received into the Treasury under this act shall constitute a fund for the payment of the salaries of the officers and clerks herein provided for, and all other expenses of the Patent Office, and to be called the Patent Fund.

Sec. 10. *And be it further enacted*, That where any person hath made, or shall have made, any new invention, discovery, or improvement, on account of which a patent might by virtue of this act be granted, and such person shall die before any patent shall be granted therefor, the right of applying for and obtaining such patent shall devolve on the executor or administrator of such person, in trust for the heirs-at law of the deceased, in case he shall have died intestate; but if otherwise, then in trust for his devisees, in as full and ample manner, and under the same conditions, limitations, and restrictions, as the same was held, or might have been claimed or enjoyed by such person in his or her lifetime; and when application for a patent shall be made by such legal representatives, the oath or affiirmation provided in the 6th section of this act shall be so varied as to be applicable to them.

Sec. 11. *And be it further enacted*, That every patent shall be assignable in law, either as to the whole interest, or any undivided part thereof, by any instrument in writing; which assignment, and also every grant and conveyance of the exclusive right under any patent, to make and use, and to grant to others to make and use, the thing patented within and throughout any specified part or portion of the United States, shall be recorded in the Patent Office within three months from the execution thereof, for which the assignee or grantee shall pay to the Commissioner the sum of three dollars.

Sec. 12. *And be it further enacted*, That any citizen of the United States, or alien who shall have been a resident of the United States one year next preceding, and shall have made oath of his intention to become a citizen thereof, who shall have invented any new art, machine, or improvement thereof, and shall desire further time to mature the same, may, on paying to the credit of the Treasury, in manner as provided in the ninth section of this act, the sum of twenty dollars, file in the Patent Office a caveat setting forth the design and purpose thereof, and its principal and distinguishing characteristics, and praying protection of his right, till he shall have matured his invention; which sum of twenty dollars, in case the person filing such caveat shall afterwards take out a patent for the invention therein mentioned, shall be considered a part of the sum herein required for the same. And such caveat shall be filed in the confidential archives of the office, and preserved in secrecy. And if application shall be made by any other person, within one year from the time of filing such caveat, for a patent of any invention with which it may in any respect interfere, it shall be the duty of the Commissioner to deposite the description, specifications, drawings, and model, in the confidential archives of the office, and to give notice (by mail) to the person filing the caveat of such application, who shall within three months after receiving the notice, if he would avail himself of the benefit of his caveat, file his description, specifications, drawings, and model; and if, in the opinion of the Commissioner, the specifications of claim interfere with each other, like proceedings may be had in all respects as are in this act provided in the case of interfering applications. *Provided, however*. That no opinion or decision of any board of examiners, under the provisions of this act, shall preclude any person interested in favor of or against the validity of any patent which has been or may hereafter be granted, from the right to contest the same in any judicial court, in any action in which its validity may come in question.

Sec. 13. *And be it further enacted*, That whenever any patent. which has heretofore been granted, or which shall hereafter be granted, shall be inoperative or invalid, by reason of a defective or insufficient description or specification, or by reason of the patentee claiming in his specification, as his own invention, more than he had or shall have a right to claim as new, if the error has or shall have arisen by inadvertency, accident or mistake, and without any fraudulent or deceptive intention, it shall be lawful for the Commissioner, upon the surrender to him of such patent, and the payment of the further duty of fifteen dollars, to cause a new patent to be issued to the said inventor for the same invention, for the residue of the period then unexpired, for which the original patent was granted, in accordance with the patentee's corrected description and specification. And in case of his death, or any assignment by him made of the original patent, a similar right shall vest in his executors, administrators, or assignees. And the patent so re-issued, together with the corrected description and specifications, shall have the same effect and operation in law, on the trial of all actions hereafter commenced for causes subsequently accruing, as though the same had been originally filed in such corrected form, before the issuing of the original patent. And whenever the original patentee shall be desirous of adding the description and specification of any new improvement of the original invention or discovery, which shall have been invented or discovered by him subsequent to the date of his patent, he may, like proceedings being had in all respects as in the case of original applications, and on the payment of fifteen dollars, as hereinbefore provided, have the same annexed to the original description and specification; and the Commissioner shall certify, on the margin of such annexed description and specification, the time of its being annexed and recorded; and the same shall thereafter have the same effect in law, to all intents and purposes, as though it had been embraced in the original description and specification.

Sec. 14. *And be it further enacted*, That whenever, in any action for damages [for] making, using, or selling the thing whereof the exclusive right is secured by any patent heretofore granted, or by any patent which may hereafter be granted, a verdict shall be rendered for the plaintiff in such action, it shall be in the power of the court to render judgment of any sum above the amount found by such verdict as the actual damages sustained by the plaintiff, not exceeding three times the amount thereof, according to the circumstances of the case, with costs; and such damages may be recovered by action on the case, in any court of competent jurisdiction, to be brought in the name or names of the person or persons interested, whether as patentee, assignees, or as grantees of the exclusive right within and throughout a specified part of the United States.

Sec. 15. *And be it further enacted*, That the defendant in any such action shall be permitted to plead the general issue, and to give this act and any special matter in evidence, of which notice in writing may have been given to the plaintiff or his attorney, thirty days before trial, tending to prove that the description and specification filed by the plaintiff, does not contain the whole truth relative to hi sinvention or discovery, or that it contains more than is necessary to produce the described effect; which concealment or addition shall fully appear to have been made for the purpose of deceiving the public, or that the patentee was not the original and first inventor or discoverer of the thing patented, or of a substantial and material part thereof claimed as new, or that it had been described in some public work anterior to the supposed discovery thereof by the patentee, or had been in public use or on sale with the consent and allowance of the patentee before his application for a patent, or that he had surreptitiously or unjustly obtained the patent for that which was in fact invented or discovered by another, who was using reasonable diligence in adapting and perfecting the same; or that the patentee, if an alien at the time the patent was granted, had failed and neglected, for the space of eighteen months from the date of the patent, to put and continue on sale to the public, on reasonable terms, the invention or discovery for which the patent issued; and whenever the defendant relies in his defence on the fact of a previous invention, knowledge, or use of the thing patented, he shall state, in his notice of special matter, the names and places of residence of those whom he intends to prove to have possessed a prior knowledge of the thing, and where the same had been used; in either of which cases, judgment shall

be rendered for the defendant, with costs: *Provided, however*, That whenever it shall satisfactorily appear that the patentee, at the time of making his application for the patent believed himself to be the first inventor or discoverer of the thing patented, the same shall not be held to be void on account of the invention or discovery, or any part thereof, having been before known or used in any foreign country; it not appearing that the same, or any substantial part thereof, had before been patented or described in any printed publication: *And provided, also*, That whenever the plaintiff shall fail to sustain his action on the ground that in his specification or claim is embraced more than that of which he was the first inventor, if it shall appear that the defendant had used or violated any part of the invention justly and truly specified and claimed as new, it shall be in the power of the court to adjudge and award, as to costs, as may appear to be just and equitable.

SEC. 16. *And be it further enacted*, That whenever there shall be two interfering patents, or whenever a patent or application shall have been refused on an adverse decision of a board of examiners, on the ground that that patent applied for would interfere with an unexpired patent previously granted, any person interested in any such patent, either by assignment or otherwise in the one case, and any such applicant in the other case, may have remedy by bill in equity; and the Court having cognizance thereof, on notice to adverse parties, and other due proceedings had, may adjudge and declare either the patents void in the whole or in part, or inoperative and invalid in any particular part or portion of the United States, according to the interest which the parties to such suit may possess in the patent or the inventions patented, and may also adjudge that such applicant is entitled, according to the principles and provisions of this act, to have and receive a patent for his invention, as specified in his claim, or for any part thereof, as the fact of priority of right or invention shall, in any such case, be made to appear. And such adjudication, if it be in favor of the right of such applicant, shall authorize the Commissioner to issue such patent, on his filing a copy of the adjudication, and otherwise complying with the requisitions of this act. *Provided, however*, That no such judgment or adjudication shall affect the rights of any person, except the parties to the action, and those deriving title from or under them subsequent to the rendition of such judgment.

SEC. 17. *And be it further enacted*, That all actions, suits, controversies, and cases arising under any law of the United States, granting or confirming to inventors the exclusive right to their inventions or discoveries, shall be originally cognizable, as well in equity as at law, by the circuit courts of the United States, or any district court having the powers and jurisdiction of a circuit court; which courts shall have power, upon a bill in equity filed by any party aggrieved, in any such case, to grant injunctions, according to the course and principles of courts of equity, to prevent the violation of the rights of any inventor as secured to him by any law of the United States, on such terms and conditions as said courts may deem reasonable: *Provided, however*, That from all judgments and decrees from any such court rendered in the premises, a writ of error or appeal, as the case may require, shall lie to the Supreme Court of the United States, in the same manner and under the same circumstances as is now provided by law in other judgments and decrees of circuit courts, and in all other cases in which the court shall deem it reasonable to allow the same.

SEC. 18. *And be it further enacted*, That whenever any patentee of an invention or discovery shall desire an extension of his patent beyond the term of its limitation, he may make application therefor, in writing, to the Commissioner of the Patent Office, setting forth the grounds thereof; and the Commissioner shall, on the applicant's paying the sum of forty dollars to the credit of the Treasury, as in the case of an original application for a patent, cause to be published in one or more of the principal newspapers in the city of Washington, and in such other paper or papers as he may deem proper, published in the section of country most interested adversely to the extension of the patent, a notice of such application, and of the time and place when and where the same will be considered, that any person may appear and show cause why the extension should not be granted. And the Secretary of State, the Commissioner of the Patent Office, and the Solicitor of the Treasury, shall constitute a board to hear and decide upon the evidence produced before them, both for and against the extension, and shall sit for that purpose at the time and place designated in the published notice thereof. The patentee shall furnish to said board a statement, in writing, under oath, of the ascertained value of the invention, and of his receipts and expenditures, sufficiently in detail to exhibit a true and faithful account of loss and profit in any manner accruing to him from and by reason of said invention. And if, upon a hearing of the matter, it shall appear to the full and entire satisfaction of said board, having due regard to the public interest therein, that it is just and proper that the term of the patent should be extended by reason of the patentee, without neglect or fault on his part, having failed to obtain, from the use and sale of his invention, a reasonable remuneration for the time, ingenuity and expense bestowed upon the same, and the introduction thereof into use, it shall be the duty of the Commissioner to renew and extend the patent, by making a certificate thereon of such extension, for the term of seven years from and after the expiration of the first term; which certificate, with a certificate of said board of their judgment and opinion as aforesaid, shall be entered on record in the Patent Office; and thereupon the said patent shall have the same effect in law as though it had been originally granted for the term of twenty-one years; and the benefit of such renewal shall extend to assignees and grantees of the right to use the thing patented, to the extent of their respective interests therein: *Provided, however*, That no extension of a patent shall be granted after the expiration of the term for which it was originally issued.

SEC. 19. *And be it further enacted*, That there shall be provided, for the use of said office, a library of scientific works and periodical publications, both foreign and American, calculated to facilitate the discharge of the duties hereby required of the chief officers therein, to be purchased under the direction of the Committee of the Library of Congress. And the sum of fifteen hundred dollars is hereby appropriated for that purpose, to be paid out of the patent fund.

SEC. 20. *And be it further enacted*, That it shall be the duty of the Commissioner to cause to be classified and arranged, in such rooms or galleries as may be provided for that purpose, in suitable cases, when necessary for their preservation, and in such manner as shall be conducive to a beneficial and favorable display thereof, the models and specimens of compositions and of fabrics, and other manufactures and works of art, patented or unpatented, which have been, or shall hereafter be, deposited in said office. And said rooms or galleries shall be kept open during suitable hours for public inspection.

SEC. 21. *And be it further enacted*, That all acts and parts of acts heretofore passed on this subject, be, and the same are hereby, repealed: *Provided, however*, That all actions and processes in law or equity sued out prior to the passage of this act, may be prosecuted to final judgment and execution, in the same manner as though this act had not been passed, excepting and saving the application to any such action of the provisions of the fourteenth and fifteenth sections of this act, so far as they may be applicable thereto: *And provided, also*, That all applications for petitions for patents, pending at the time of the passage of this act, in cases where the duty has been paid, shall be proceeded with and acted on in the same manner as though filed after the passage thereof.

JAMES K. POLK.
Speaker of the House of Representatives.
W. R. KING,
President of the Senate pro tempore.

Approved July 4, 1836.

ANDREW JACKSON.

AN ACT in addition to the act to promote the progress of Science and Useful Arts.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any person who may be in possession of, or in any way interested in, any patent for an invention, discovery, or improvement, issued prior to the fifteenth day of December, in the year of our Lord one thousand eight hundred and thirty-six, or in an assignment of any patent, or interest therein, executed and recorded prior to the said fifteenth day of December, may, without charge, on presentation, or transmission thereof to the Commissioner of Patents, have the same recorded anew in the Patent Office, together with the descriptions, specifications of claim, and drawings annexed or belonging to the same; and it shall be the duty of the Commissioner to cause the same, or any authenticated copy of the original record, specification, or drawing, which he may obtain, to be transcribed and copied into books of record to be kept for that purpose; and whenever a drawing was not originally annexed to the patent and referred to in the specification, any drawing produced as a delineation of the invention, being verified by oath in such manner as the Commissioner shall require, may be transmitted and placed on file, or copied as aforesaid, together with certificate of the oath; or such drawings may be made in the office, under the direction of the Commissioner, in conformity with the specification. And it shall be the duty of the Commissioner to take such measures as may be advised and determined by the Board of Commissioners provided for in the fourth section of this act, to obtain the patents, specifications, and copies aforesaid, for the purpose of being so transcribed and recorded. And it shall be the duty of each of the several clerks of the judicial courts of the United States to transmit, as soon as may be, to the Commissioner of the Patent Office, a statement of all the authenticated copies of patents, descriptions, specifications, and drawings of inventions and discoveries made and executed prior to the aforesaid fifteenth day of December, which may be found on the files of his office; and also to make out and transmit to said Commissioner, for record as aforesaid, a certified copy of every such patent, description, specification, or drawing, which shall be specially required by said Commissioner.

SECTION 2. *And be it further enacted*, That copies of such record and drawings, certified by the Commissioner, or, in his absence, by the chief clerk, shall be prima facie evidence of the particulars of the invention and of the patent granted therefor, in any judicial court of the United States, in all cases where copies of the original record or specification and drawings would be evidence, without proof of the loss of such originals; and no patent issued prior to the aforesaid fifteenth day of December shall, after the first day of June next, be received in evidence in any of the said courts in behalf of the patentee or other person who shall be in possession of the same, unless it shall have been so recorded anew, and a drawing of the invention, if separate from the patent, verified as aforesaid, deposited in the Patent Office; nor shall any written assignment of any such patent,

executed and recorded prior to the said fifteenth day of December, be received in evidence in any of the said courts in behalf of the assignee or other person in possession thereof, until it shall have been so recorded anew.

SEC. 3. *And be it further enacted*, That, whenever it shall appear to the Commissioner that any patent was destroyed by the burning of the Patent Office building on the aforesaid fifteenth day of December, or was otherwise lost prior thereto, it shall be his duty, on application therefor by the patentee or other person interested therein, to issue a new patent for the same invention or discovery, bearing the date of the original patent, with his certificate thereon, that it was made and issued pursuant to the provisions of the third section of this act, and shall enter the same of record: *Provided, however*, That before such patent shall be issued, the applicant therefor shall deposite in the Patent Office a duplicate, as near as may be, of the original model, drawings, and descriptions, with specifications of the invention or discovery, verified by oath, as shall be required by the Commissioner; and such patent and copies of such drawings and descriptions, duly certified, shall be admissible as evidence in any judicial court of the United States, and shall protect the rights of the patentee, his administrators, heirs, and assigns, to the extent only in which they would have been protected by the original patent and specification.

SEC. 4. *And be it further enacted*, That it shall be the duty of the Commissioner to procure a duplicate of such of the models destroyed by fire on the aforesaid fifteenth day of December, as were most valuable and interesting, and whose preservation would be important to the public; and such as would be necessary to facilitate the just discharge of the duties imposed by law on the Commissioner in issuing patents, and to protect the rights of the public and of patentees in patented inventions and improvements: *Provided*, That a duplicate of such models may be obtained at a reasonable expense: *And provided, also*, That the whole amount of expenditure for this purpose shall not exceed the sum of one hundred thousand dollars. And there shall be a temporary board of commissioners, to be composed of the Commissioner of the Patent Office and two other persons to be appointed by the President, whose duty it shall be to consider and determine upon the best and most judicious mode of obtaining models of suitable construction; and, also, to consider and determine what models may be procured in pursuance of, and in accordance with, the provisions and limitations in this section contained. And said Commissioners may make and establish all such regulations, terms, and conditions, not inconsistent with law, as in their opinion may be proper and necessary to carry the provisions of this section into effect, according to its true intent.

SEC. 5. *And be it further enacted*, That, whenever a patent shall be returned for correction and re-issue, under the thirteenth section of the act to which this is additional, and the patentee shall desire several patents to be issued for distinct and separate parts of the thing patented, he shall first pay, in manner and in addition to the sum provided by that act, the sum of thirty dollars for each additional patent so to be issued: *Provided, however*, That no patent made prior to the aforesaid fifteenth day of December, shall be corrected and re-issued until a duplicate of the model and drawing of the thing, as originally invented, verified by oath as shall be required by the Commissioner, shall be deposited in the Patent Office. Nor shall any addition of an improvement be made to any patent heretofore granted, nor any new patent be issued for an improvement made in any machine, manufacture, or process, to the original inventor, assignee, or possessor, of a patent therefor, nor any disclaimer be admitted to record, until a duplicate model and drawing of the thing originally invented, verified as aforesaid, shall have been deposited in the Patent Office, if the Commissioner shall require the same; nor shall any patent be granted for an invention, improvement, or discovery, the model or drawing of which shall have been lost, until another model and drawing, if required by the Commissioner, shall, in like manner, be deposited in the Patent Office. And in all such cases, as well as in those which may arise under the third section of this act, the question of compensation for such models and drawing, shall be subject to the judgment and decision of the Commissioners provided for in the fourth section, under the same limitations and restrictions as are therein prescribed.

SEC. 6. *And be it further enacted*, That any patent hereafter to be issued, may be made and issued to the assignee or assignees of the inventor or discoverer, the assignment thereof being first entered of record, and the application therefor being duly made, and the specification duly sworn to by the inventor. And in all cases hereafter, the applicant for a patent shall be held to furnish duplicate drawings, whenever the case admits of drawings, one of which to be deposited in the office, and the other to be annexed to the patent, and considered a part of the specification.

SEC. 7. *And be it further enacted*, That whenever any patentee shall have, through inadvertence, accident, or mistake, made his specification of claim too broad, claiming more than that of which he was the original or first inventor, some material and substantial part of the thing patented being truly and justly his own, any such patentee, his administrators, executors, and assigns, whether of the whole or of a sectional interest therein, may make disclaimer of such parts of the thing patented as the disclaimant shall not claim to hold by virtue of the patent or assignment, stating therein the extent of his interest in such patent; which disclaimer shall be in writing, attested by one or more witnesses, and recorded in the Patent Office, on payment by the person disclaiming, in manner as other patent duties are required by law to be paid, of the sum of ten dollars. And such disclaimer shall thereafter be taken and considered as part of the original specification, to the extent of the interest which shall be possessed in the patent or right secured thereby, by the disclaimant, and by those claiming by or under him, subsequent to the record thereof. But no such disclaimer shall affect any action pending at the time of its being filed, except so far as may relate to the question of unreasonable neglect or delay in filing the same.

SEC. 8. *And be it further enacted*, That whenever application shall be made to the Commissioner for any addition of a newly discovered improvement to be made to an existing patent, or whenever a patent shall be returned for correction and re-issue, the specification of claim annexed to every such patent shall be subject to revision and restriction, in the same manner as are original applications for patents; the Commissioner shall not add any such improvement to the patent in the one case, nor grant the re-issue in the other case, until the applicant shall have entered a disclaimer, or altered his specification of claim in accordance with the decision of the Commissioner; and in all such cases, the applicant, if dissatisfied with such decision, shall have the same remedy, and be entitled to the benefit of the same privileges and proceedings, as are provided by law in the case of original applications for patents.

SEC. 9. *And be it further enacted*, (any thing in the fifteenth section of the act, to which this is additional, to the contrary notwithstanding,) That whenever, by mistake, accident, or inadvertence, and without any wilful default or intent to defraud or mislead the public, any patentee shall have in his specification claimed to be the original and first inventor or discoverer of any material or substantial part of the thing patented, of which he was not the first and original inventor, and shall have no legal or just right to claim the same, in every such case the patent shall be deemed good and valid for so much of the invention or discovery as shall be truly and bona fide his own: *Provided*, It shall be a material and substantial part of the thing patented, and be definitively distinguishable from the other parts so claimed without right as aforesaid. And every such patentee, his executors, administrators and assigns, whether of a whole or of a sectional interest therein, shall be entitled to maintain a suit at law or in equity on such patent for any infringement of such part of the invention or discovery as shall be bona fide his own as aforesaid, notwithstanding the specification may embrace more than he shall have any legal right to claim. But in every such case in which a judgment or verdict shall be rendered for the plaintiff, he shall not be entitled to recover costs against the defendant, unless he shall have entered at the Patent Office, prior to the commencement of the suit, a disclaimer of all that part of the thing patented which was so claimed without right: *Provided, however*, That no person bringing any such suit shall be entitled to the benefits of the provisions contained in this section, who shall have unreasonably neglected or delayed to enter at the Patent Office a disclaimer as aforesaid.

SEC. 10. *And be it further enacted*, That the Commissioner is hereby authorized and empowered to appoint agents in not exceeding twenty of the principal cities or towns in the United States, as may best accomodate the different sections of the country, for the purpose of receiving and forwarding to the Patent Office all such models, specimens of ingredients and manufactures, as shall be intended to be patented or deposited therein, the transportation of the same to be chargeable to the patent fund.

SEC. 11. *And be it further enacted*, That instead of one examining clerk, as provided by the second section of the act to which this is additional, there shall be appointed, in manner therein provided, two examining clerks, each to receive an annual salary of fifteen hundred dollars; and, also, an additional copying clerk, at an annual salary of eight hundred dollars. And the Commissioner is also authorized to employ, from time to time, as many temporary clerks as may be necessary to execute the copying and draughting required by the first section of this act, and to examine and compare the records with the originals, who shall receive not exceeding seven cents for every page of one hundred words, and for drawings and comparison of records with originals, such reasonable compensation as shall be agreed upon or prescribed by the Commissioner.

SEC. 12. *And be it further enacted*, That whenever the application of any foreigner for a patent shall be rejected and withdrawn for want of novelty in the invention, pursuant to the seventh section of the act to which this is additional, the certificate thereof of the Commissioner shall be a sufficient warrant to the Treasurer to pay back to such applicant two-thirds of the duty he shall have paid into the Treasury on account of such application.

SEC. 13. *And be it further enacted*, That in all cases in which an oath is required by this act, or by the act to which this is additional, if the person of whom it is required shall be conscientiously scrupulous of taking an oath, affirmation may be substituted therefor.

SEC. 14. *And be it further enacted*, That all moneys paid into the Treasury of the United States for patents and for fees for copies furnished by the Superintendent of the Patent Office prior to the passage of the act of which this is additional, shall be carried to the credit of the patent fund created by said act; and the moneys constituting said fund shall be, and the same are hereby, appropriated for the payment of the salaries of the officers and clerks provided by said act, and all other expenses of the Patent Office, including all the expenditures provided for by this act; and, also, for such other purposes as are or may be hereafter specially provided for by law. And the Commissioner is hereby authorized to draw upon said fund, from time to time, for such sums as shall be necessary to carry

into effect the provisions of this act, governed, however, by the several limitations herein contained. And it shall be his duty to lay before Congress, in the month of January, annually, a detailed statement of the expenditures and payments by him made from said fund. And it shall also be his duty to lay before Congress, in the month of January, annually, a list of all patents which shall have been granted during the preceding year, designating, under proper heads, the subjects of such patents, and furnishing an alphabetical list of the patentees, with their places of residence; and he shall also furnish a list of all patents which shall have become public property during the same period; together with such other information of the state and condition of the Patent Office as may be useful to Congress or to the public.

Approved, March 3d, 1837.

A BILL in addition to an "Act to promote the progress of the Useful Arts."

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be appointed, in manner provided in the second section of the act to which this is additional, two assistant examiners, each to receive an annual salary of twelve hundred and fifty dollars.

Sec. 2. *And be it further enacted,* That the Commissioner be authorized to employ temporary clerks to do any necessary transcribing, whenever the current business of the office requires it: *Provided, however,* That, instead of salary, a compensation shall be allowed, at a rate not greater than is charged for copies now furnished by the office.

Sec. 3. *And be it further enacted,* That the Commissioner is hereby authorized to publish a classified and alphabetical list of all patents granted by the Patent Office previous to said publication, and retain one hundred copies for the Patent Office, and nine hundred copies to be deposited in the library of Congress, for such distribution as may be hereafter directed; and that one thousand dollars, if necessary, be appropriated, out of the patent fund, to defray the expense of the same.

Sec 4. *And be it further enacted,* That the sum of three thousand six hundred and fifty-nine dollars and twenty-two cents be, and is hereby, appropriated from the patent fund, to pay for the use and occupation of rooms in the City Hall by the Patent Office.

Sec. 5. *And be it further enacted,* That the sum of one thousand dollars be appropriated from the patent fund, to be expended under the direction of the Commissioner, for the purchase of necessary books for the library of the Patent Office.

Sec. 6. *And be it further enacted,* That no person shall be debarred from receiving a patent for any invention or discovery, as provided in the act approved on the fourth day of July, one thousand eight hundred and thirty-six, to which this is additional, by reason of the same having been patented in a foreign country more than six months prior to his application: *Provided,* That the same shall not have been introduced into public and common use in the United States prior to the application for such patent: *And provided, also,* That in all cases every such patent shall be limited to the term of fourteen years from the date or publication of such foreign letters patent.

Sec. 7. *And be it further enacted,* That every person or corporation who has, or shall have, purchased or constructed any newly invented machine, manufacture, or composition of matter, prior to the application by the inventor or discoverer for a patent, shall be held to possess the right to use, and vend to others to be used, the specific machine, manufacture, or composition of matter so made or purchased, without liability therefor to the inventor, or any other person interested in such invention; and no patent shall be held to be invalid by reason of such purchase, sale, or use, prior to the application for a patent as aforesaid, except on proof of abandonment of such invention to the public, or that such purchase, sale, or prior use has been for more than two years prior to such application for a patent.

Sec. 8. *And be it further enacted,* That so much of the eleventh section of the above recited act as requires the payment of three dollars to the Commissioner of Patents for recording any assignment, grant, or conveyances of the whole or any part of the interest or right under any patent, be, and the same is hereby repealed; and all such assignments, grants, and conveyance shall, in future, be recorded without any charge whatever.

Sec. 9. *And be it further enacted,* That a sum of money, not exceeding one thousand dollars, be, and the same is hereby, appropriated out of the patent fund, to be expended by the Commissioner of Patents in the collection of agricultural statistics, and for other agricultural purposes; for which the said Commissioner shall account in his next annual report.

Sec. 10. *And be it further enacted,* That the provisions of the sixteenth section of the before recited act shall extend to all cases where patents are refused for any reason whatever, either by the Commissioner of Patents or by the Chief Justice of the District of Columbia, upon appeals from the decision of said Commissioner, as well as where the same shall have been refused on account of, or by reason of, interference with a previously existing patent; and in all cases where there is no opposing party, a copy of the bill shall be served upon the Commissioner of Patents, when the whole of the expenses of the proceeding shall be paid by the applicant, whether the final decision shall be in his favor or otherwise.

Sec. 11. *And be it further enacted,* That in cases where an appeal is now allowed by law from the decision of the Commissioner of Patents to a board of examiners provided for in the seventh section of the act to which this is additional, the party, instead thereof, shall have a right to appeal to the Chief Justice of the district court of the United States for the District of Columbia, by giving notice thereof to the Commissioner, and filing in the Patent Office, within such time as the Commissioner shall appoint his reasons of appeal, specifically set forth in writing, and also paying into the Patent Office, to the credit of the patent fund, the sum of twenty-five dollars. And it shall be the duty of said Chief Justice, on petition, to hear and determine all such appeals, and to revise such decisions in a summary way, on the evidence produced before the Commissioners, at such early and convenient time as he may appoint, first notifying the Commissioner of the time and place of hearing, whose duty it shall be to give notice thereof to all the parties who appear to be interested therein, in such manner as said judge shall prescribe. The Commissioner shall also lay before the said judge all the original papers and evidence in the case, together with the grounds of his decision, fully set forth in writing, touching all the points involved by the reasons of appeal, to which the revision shall be confined. And at the request of any party interested, or at the desire of the judge, the Commissioner and the examiners in the Patent Office may be examined under oath, in explanation of the principles of the machine or other thing for which a patent, in such case, is prayed for. And it shall be the duty of the said judge, after a hearing of any such case, to return all the papers to the Commissioner, with a certificate of his proceedings and decision, which shall be entered of record in the Patent Office; and such decision, so certified, shall govern the further proceedings of the Commissioner in such case: *Provided, however,* That no opinion or decision of the judge in any such case shall preclude any person interested in favor or against the validity of any patent which has been, or may hereafter be, granted, from the right to contest the same in any judicial court, in any action in which its validity may come in question.

Sec 12. *And be it further enacted,* That the Commissioner of Patents shall have power to make all such regulations in respect to the taking of evidence to be used in contested cases before him, as may be just and reasonable. And so much of the act to which this is additional as provides for a board of examiners, is hereby repealed.

Sec. 13. *And be it further enacted,* That there be paid annually, out of the patent fund, to the said Chief Justice, in consideration of the duties herein imposed, the sum of one hundred dollars.

Approved, March 3d, 1839.

AN ACT in addition to an act to promote the progress of the Useful Arts, and to repeal all acts and parts of acts heretofore made for that purpose.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Treasurer of the United States be, and he hereby is, authorized to pay back, out of the patent fund, any sum or sums of money, to any person who shall have paid the same into the Treasury, or to any receiver or depository to the credit of the Treasurer, as for fees accruing at the Patent Office through mistake, and which are not provided to be paid by existing laws, certificate thereof being made to said Treasurer by the Commissioner of Patents.

Sec. 2. *And be it further enacted,* That the third section of the act of March, eighteen hundred and thirty-seven, which authorizes the renewing of patents lost prior to the fifteenth of December, eighteen hundred and thirty-six, is extended to patents granted prior to said fifteenth day of December, though they may have been lost subsequently: *Provided, however,* The same shall not have been recorded anew under the provisions of said act.

Sec. 3. *And be it further enacted,* That any citizen, or citizens, or alien or aliens, having resided one year in the United States, and taken the oath of his or their intention to become a citizen or citizens, who by his, her, or their own industry, genius, efforts, and expense, may have invented or produced any new and original design for a manufacture, whether of metal or other material or materials, or any new and original design for the printing of woollen, silk, cotton, or other fabrics, or any new and original design for a bust, statue, or bas relief or composition in alto or basso relievo, or any new and original impression or ornament, or to be placed on any article of manufacture, the same being formed in marble or other material, or any new and useful pattern, or print, or picture, to be either worked into or worked on, or printed, or painted, or cast, or otherwise fixed on, any article of manufacture, or any new and original shape or configuration of any article of manufacture not known or used by others before his, her, or their invention or production thereof, and prior to the time of his, her, or their application for a patent therefor, and who shall desire to obtain an exclusive property or right therein to make, use, and sell and vend the same, or copies of the same, to others, by them to be made, used, and sold, may make application, in writing, to the Commissioner of Patents expressing such desire, and the Commissioner, on due proceedings had, may grant a patent therefor, as in the case now of application for a patent: *Provided,* That the fee in such cases, which by the now existing laws would be required of the particular applicant,

shall be one-half the sum, and that the duration of said patent shall be seven years, and that all the regulations and provisions which now apply to the obtaining or protection of patents not inconsistent with the provisions of this act, shall apply to applications under this section.

Sec. 4. *And be it further enacted*, That the oath required for applicants for patents may be taken, when the applicant is not, for the time being, residing in the United States, before any minister, plenipotentiary, charge d'affaires, consul, or commercial agent holding commission under the Government of the United States, or before any notary public of the foreign country in which such applicant may be.

Sec. 5. *And be it further enacted*, That if any person or persons shall paint, or print, or mould, cast, carve, or engrave, or stamp, upon anything made, used, or sold by him, for the sole making or selling which he hath not, or shall not have obtained letters patent, the name or any imitation of the name of any other person who hath or shall have obtained letters patent for the sole making and vending of such thing, without consent of such patentee, or his assigns or legal representatives; or if any person, upon any such thing not having been purchased from the patentee, or some person who purchased it from or under such patentee, or not having the license or consent of such patentee, or his assigns or legal representatives, shall write, paint, print, mould, cast, carve, or engrave, stamp, or otherwise make or affix the word "patent," or the words "letters patent," or the word "patentee," or any word or words of like kind, meaning, or import, with the view or intent of imitating or counterfeiting the stamp, mark, or other device of the patentee, or shall affix the same, or any word, stamp, or device of like import, on any unpatented article for the purpose of deceiving the public, he, she, or they, so offending, shall be liable for such offence to a penalty of not less than one hundred dollars, with costs, to be recovered by action in any of the circuit courts of the United States, or in any of the district courts of the United States having the powers and jurisdiction of a circuit court; one-half of which penalty, as recovered, shall be paid to the patent fund, and the other half to any person or persons who shall sue for the same.

Sec. 6. *And be it further enacted*, That all patentees and assignees of patents hereafter granted, are hereby required to stamp, engrave, or cause to be stamped or engraved, on each article vended or offered for sale, the date of the patent; and if any person or persons, patentees or assignees, shall neglect to do so, he, she or they shall be liable to the same penalty, to be recovered and disposed of in the manner specified in the foregoing fifth section of this act.

Approved, August 29th, 1842.

INFORMATION

TO PERSONS HAVING BUSINESS TO TRANSACT AT THE PATENT OFFICE.

Sec. 1. The existing laws relating to patents are those approved July 4, 1836, March 3, 1837, and March 3, 1839, all former acts having been repealed by the act of 1836.

Sec. 2. "Patents are granted for any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement on any art, machine, manufacture, or composition of matter, not known or used by others before his or their discovery or invention thereof, and not, at the time of his application for a patent, in public use, or on sale, with his or their consent, or allowance, as the inventor or discoverer."—Act of 1836, section 6. "No patent shall be held to be invalid by reason of the purchase, sale, or use, [of the invention,] prior to the application for a patent as aforesaid, except on proof of abandonment of such invention to the public, or that such purchase, sale, or public use, has been for more than two years prior to such application for a patent."—Act of March 3, 1839.

Sec. 3. The term for which a patent is granted is fourteen years; but it may, under certain circumstances, be renewed for seven years, as hereinafter mentioned.

Sec. 4. Patents are granted to citizens of the United States, to aliens who shall have been resident in the United States one year next preceding, and shall have made oath of their intention to become citizens thereof, and also to foreigners who are inventors or discoverers.

Sec. 5. A patent may be taken out by the inventor in a foreign country, without affecting his right to a patent in the United States, provided the invention has not been introduced into public and common use in the United States prior to the application for such patent. In every such case the patent is limited to fourteen years from the date of the foreign letters patent. A patent is not granted upon introduction of a new invention from a foreign country, unless the person who introduced it be the inventor or discoverer. If an alien neglects to put and continue on sale the invention in the United States, to the public, on reasonable terms, for eighteen months, the patentee loses all benefit of the patent.

Sec. 6. Joint inventors are entitled to a joint patent, but neither can claim one separately.

Sec. 7. An inventor can assign his right before a patent is obtained, so as to enable the assignee to take out a patent in his own name; but the assignment must be first entered of record; and the application therefor must be duly made, and the specification signed, and sworn to by the inventor. And in the case of an assignment by a foreigner, the same fee will be required as if the patent issued to the inventor.

Sec. 8. The assignment of a patent may be to the whole or to an undivided part, "by any instrument in writing." All assignments, and also the grant or conveyance of the use of the patent in any town, county, State, or specified district, must be recorded in the Patent Office within three months from date of the same. But assignments, if recorded after three months have expired, will be on record as notice to protect against subsequent purchases. No fee is now charged for recording assignments. Patents, grants, and assignments, recorded prior to the 15th of December, 1836, must be recorded anew before they can be valid as evidence of any title. This is also done free of expense.

Sec. 9. In case of the decease of an inventor, before he has obtained a patent for his invention, "the right of applying for and obtaining such patent shall devolve on the administrator or executor of such person, in trust for the heirs at law of the deceased, if he shall have died intestate; but if otherwise, then in trust for his devisees, in as full and ample manner, and under the same conditions, limitations, and restrictions, as the same was held, or might have been claimed or enjoyed, by such person in his or her lifetime; and when application for a patent shall be made by such legal representatives, the oath or affirmation shall be so varied as to be applicable to them."—Act of 1836, sec. 10.

Sec. 10. The Patent Office will be open for examination during office hours, and applicants can personally, or by attorney, satisfy themselves, on inspection of models and specifications, of the expediency of filing an application for a patent.

Sec. 11. All fees received are paid into the Treasury, and the law has required the payment of the patent fee before the application is considered; two-thirds of which fee is refunded on withdrawing the application. But no money is refunded on the withdrawal of an application, after an appeal has been taken from the decision of the Commissioner of Patents. And no part of the fee paid for caveats, and on applications for the addition of improvements, re-issues, and appeals, can be withdrawn.

Sec. 12. It is a frequent practice for inventors to send a description of their inventions to the office, and inquire whether there exists any thing like it, and whether a patent can be had therefor. *As the law does not provide for the examination of descriptions of new inventions, except upon applications for a patent, no answers can be given to such inquiries.*

ON THE APPLICATION FOR A PATENT.

Sec. 13. No application can be examined until the fee for the patent is paid, and the specification, model, and drawings filed.

Sec. 14. The application for a patent must be made by petition to the *Commissioner of Patents*, signifying the desire of obtaining an exclusive property in the invention or discovery, and praying that a patent may be granted therefor, as in the form annexed thereto; *which petition should be signed by the inventor.*

DESCRIPTION OF SPECIFICATION.

Sec. 15. Before any inventor shall receive a patent for any such new invention or discovery, he shall deliver a written description of his invention or discovery, and of the manner and process of making, constructing, using, and compounding the same, in such full, clear, and exact terms, avoiding unnecessary prolixity, as to enable any person skilled in the art or science to which it appertains, or with which it is most clearly connected, to make, construct, compound, and use the same; and in case of any machine he shall fully explain the principle, and the several modes in which he has contemplated the application of that principle or character by which it may be distinguished from other inventions; and shall particularly specify and point out the part, improvement, or combination, which he claims as his own invention or discovery.—Act of 1836, sec. 6. [See form annexed.]

Sec. 16. It is important, in all cases, to have the specification describe the sections of the drawings, and refer by letters to the parts; duplicate drawings being required.

Sec. 17. A *defective* specification or drawing may be amended at any time before a patent has issued; in which case the applicant will be required to make oath anew.

ON NEW IMPROVEMENTS.

Sec. 18. "Whenever the original patentee shall be desirous of adding the description and specification of any new improvement of the original invention or discovery, which shall have been invented or discovered by him subsequent to the date of his patent, he may, like proceedings being had in all respects as in the case of original applications, and on the payment of fifteen dollars, as hereinafter mentioned, have the same annexed

to the original description and specification; and the Commissioner shall certify on the margin of such annexed description and specification, the time of its being annexed and recorded; and the same shall thereafter have the same effect in law, to all intents and purposes, as though it had been embraced in the original description and specification."—Act of 1836, sec. 13.

SEC. 19. In all such cases, the claim in the original patent is subject to a re-examination; and if it shall appear that any part of the claim was not original at the time of granting the patent, a disclaimer of said part must be filed in the Patent Office, or the specification of claims restricted, by having the patent re-issued before the improvement can be added. And if there is not any thing which can be claimed, the improvement cannot be added, but may be secured by a separate patent, on the payment of the fee of thirty dollars. If the patent was granted before the 15th of December, 1836, a model and drawings of the invention as first patented, verified by oath, must be furnished, unless dispensed with by the Commissioner.

SEC. 20. No patent for an improvement can be granted to the original inventor, assignee, or possessor of a patent granted before the 15th of December, 1836, until a model and drawings of the invention, as originally patented, verified by oath, shall have been deposited, unless dispensed with by the Commissioner.

SEC. 21. "Every inventor, before he can receive a patent, must make oath or affirmation that he does verily believe that he is the original and first inventor or discoverer of the art, machine, manufacture, composition, or improvement, for which he solicits a patent; and that he does not know or believe that the same was ever before known or used; and also of what country he is a citizen."—Act of 1836, sec. 6. [See form annexed.] In every case the oath or affidavit must be made before a person having general powers to administer oaths. Justices of the Peace have not in all cases this general power.

SEC. 22. If the applicant be an alien, and have resided one year in the United States next preceding the application, and have given legal notice of his intention to become a citizen of the United States, he must make oath to these facts before he can apply for a patent for the same fee as that paid by a citizen.

OF DRAWINGS AND SPECIMENS OF INGREDIENTS.

SEC. 23. The law requires that "the applicant for a patent shall accompany his application with drawings and written references, *when the nature of the case admits of drawings.*" These drawings should, in general, be in perspective, and neatly executed; and such parts as cannot be showed in perspective, must, if described, be represented in section, or detail. Duplicates of them are required, as one must accompany the patent when issued, as explanatory of it, and one must be kept on file in the office.

SEC. 24. The drawings must be signed by the patentee, and attested by two witnesses, except when the specification describes the sections or figures, and refers to the parts by letters; in which case they are neither required to be signed nor accompanied by written references upon the drawings, the whole making one instrument. Drawings are absolutely necessary, when the case admits of them.

SEC. 25. An examination, as to originality of invention, may be made on a single drawing; but duplicates will be required before the patent issues.

OF MODELS.

SEC. 26. The law requires that the inventor shall deliver a model of his invention or improvement when the same admits of a model. The model should be neatly made, and as small as a distinct representation of the machine or improvement, and its characteristic properties, will admit; the name of the inventor should be printed or engraved upon, or affixed to it, in a durable manner. Models forwarded without a name, cannot be entered on record, and are therefore liable to be lost or mislaid.

SEC. 27. When the invention is of "a composition of matter," the law requires that the application be accompanied with specimens of the ingredients, and of the composition of matter, sufficient in quantity for the purpose of experiment.

ON GRANTING ANEW LOST PATENTS.

SEC. 28. The third section of the act of March 3, 1837, provides:

"SECTION 3. *And be it further enacted*, That whenever it shall appear to the Commissioner that any patent was destroyed by the burning of the Patent Office building on the aforesaid fifteenth day of December, or was otherwise lost prior thereto, it shall be his duty, on application therefor by the patentee, or other person interested therein, to issue a new patent for the same invention or discovery, bearing the date of the original patent, with his certificate thereon, that it was made and issued pursuant to the provisions of the third section of this act; and shall enter the same of record: *Provided, however*, That before such patent shall be issued, the applicant therefor shall deposit in the Patent Office a duplicate, as near as may be, of the original model, drawings, and description, with specification of the invention or discovery, verified by oath, as shall be required by the Commissioner; and such patent and copies of such drawings and descriptions, duly certified, shall be admissible as evidence in any judicial court of the United States, and shall protect the rights of the patentee, his administrators, heirs, and assigns, to the extent only in which they would have been protected by the original patent and specification."

PROCEEDINGS ON APPLICATION FOR PATENTS, AND ON APPEALS FROM DECISION OF THE COMMISSIONER.

(Act of 1836, sec. 7.)

SEC. 29. "That on the filing of any such application (consisting of petition, specification, model, and drawings, or specimens,) and the payment of the duty hereinafter provided, the Commissioner shall make, or cause to be made, an examination of the alleged new invention or discovery; and if, on any such examination, it shall not appear to the Commissioner that the same had been invented or discovered by any other person in this country prior to the alleged invention or discovery thereof by the applicant, or that it had been patented or described in any printed publication in this or any foreign country, or had been in public use or on sale, with the applicant's consent or allowance, prior to the application, if the Commissioner shall deem it to be sufficiently useful and important, it shall be his duty to issue a patent therefor. But whenever, on such examination, it shall appear to the Commissioner that the applicant was not the original and first inventor or discoverer thereof, or that any part of that which is claimed as new had before been invented or discovered, or patented, or described in any printed publication in this or any foreign country as aforesaid, or that the description is defective and insufficient, he shall notify the applicant thereof, giving him briefly such information and references as may be useful in judging of the propriety of renewing his application, or of altering his specification to embrace only that part of the invention or discovery which is new. In every such case, if the applicant shall elect to withdraw his application, relinquishing his claim to the model, he shall be entitled to receive back twenty dollars, part of the duty required by this act, on filing a notice in writing of such election in the Patent Office; a copy of which, certified by the Commissioner, shall be a sufficient warrant to the Treasurer for paying back to the said applicant the said sum of twenty dollars. But if the applicant, in such case, shall persist in his claim for a patent, with or without any alteration of his specification, he shall be required to make oath or affirmation anew, in manner as aforesaid; and if the specification and claim shall not have been so modified as, in the opinion of the Commissioner, shall entitle the applicant to a patent, he may appeal to the Chief Justice of the United States Court for the District of Columbia, who may affirm or reverse the decision of the Commissioner of Patents, in whole or in part, and may order a patent to issue; or he may have remedy against the decision of the Commissioner of Patents, or the decision of the Chief Justice of the United States Court for the District of Columbia, by filing a bill in equity in any of the United States Courts having jurisdiction, as hereinafter explained.

RE-ISSUE TO CORRECT A DEFECTIVE DESCRIPTION.

SEC. 30. When an applicant wishes to cancel an old patent, and to correct a mistake or error, which has arisen from inadvertence, he should state this fact in his application, and expressly *surrender* the old patent, which must be transmitted to the Patent Office before a new patent will be issued. And no improvement or alteration made subsequent to the filing of the application upon which the original patent was granted, can be introduced into a patent upon re-issue.—Section thirteen of the act of July, 1836, enacts, "That whenever any patent, which has heretofore been granted, or which shall hereafter be granted, shall be inoperative or invalid, by reason of a defective or insufficient description or specification, or by reason of the patentee claiming, in his specification, as his own invention, more than he had or shall have a right to claim as new, if the error has or shall have arisen by inadvertency, accident, or mistake, and without any fraudulent or deceptive intention, it shall be lawful for the Commissioner, upon the surrender to him of such patent, and the payment of the further duty of fifteen dollars, to cause a new patent to be issued to the said inventor for the same invention for the residue of the period then unexpired, for which the original patent was granted, in accordance with the patentee's corrected description and specification.

SEC. 31. When the original patent has been lost, before a re-issue can be granted, the original patent should first be restored (as explained in section 28 of this circular,) and then surrendered.

SEC. 32. In the re-issue, the claim is subject to an examination as in the case of original patents; and if it shall appear that any part of the claim was not original at the time of granting the patent, the re-issue will not be granted, unless said part be omitted in the claim, or a disclaimer filed in the Patent Office. And if there is not any thing which can be claimed, the re-issue cannot be granted, and the surrendered patent cannot be returned. Where the patent was granted before the 15th of December, 1836, a model and drawings of the invention as originally patented, verified by oath, must be deposited in the Patent Office before a re-issue can be granted, unless dispensed with by the Commissioner.

SEC. 33. And in case of the death of an inventor, or of any assignment of the original patent, made by him, a similar right vests in his executors,

administrators, or assignees; and the patent so re-issued, together with the corrected description and specification, have the same effect and operation in law, on the trial of all actions thereafter commenced for causes subsequently accruing, as though the same had been originally filed in such corrected form before the issuing out of the original patent.

SEC. 34. On the surrender of a patent, several patents may be issued for distinct and separate parts of the invention, upon the payment of thirty dollars for every additional patent issued.

DISCLAIMERS.

SEC. 35. The 7th section of the law of 3d March, 1837, provides as follows: "SECTION 7. *And be it further enacted*, That whenever any patentee shall have, through inadvertence, accident, or mistake, made his specification of claim too broad, claiming more than that of which he was the original or first inventor, some material and substantial part of the thing patented being truly and justly his own, any such patentee, his administrators, executors, and assigns, whether of the whole or of a sectional interest therein, may make a disclaimer of such parts of the thing patented as the disclaimant shall not claim to hold by virtue of the patent or assignment, stating therein the extent of his interest in such patent; which disclaimer shall be in writing, attested by one or more witnesses, and recorded in the Patent Office, on payment by the person disclaiming, in the manner as other patent duties are required by law to be paid, of the sum of ten dollars. And such disclaimer shall thereafter be taken and considered as part of the original specification, to the extent of the interest which shall be possessed in the patent or right secured thereby, by the disclaimant, and by those claiming by or under him, subsequent to the record thereof. But no such disclaimer shall affect any action pending at the time of its being filed, except so far as it may relate to the question of unreasonable neglect or delay in filing the same.

SEC. 36. In cases of patents granted before the 15th of December, 1836, no disclaimer will be admitted for record until a model and drawings of the invention, as originally patented, verified by oath, shall have been deposited, unless dispensed with by the Commissioner.

INTERFERING APPLICATIONS.

SEC. 37. "Whenever an application shall be made for a patent, which, in the opinion of the Commissioner, would interfere with any other patent for which an application may be pending, or with any unexpired patent which shall have been granted, it shall be the duty of the Commissioner to give notice thereof to such applicants, or patentees, as the case may be; and if either shall be dissatisfied with the decision of the Commissioner on the question of priority of right or invention, on a hearing thereof he may appeal from such decision, on the like terms and conditions as are provided in the case of applications for inventions not new; and the like proceedings shall be had, to determine which, or whether either, of the applicants is entitled to receive a patent as prayed for."—Act of 1836, sec. 8.

CAVEATS.

SEC. 38. The law enacts, "That any citizen of the United States, or alien who shall have been a resident of the United States one year next preceding, and shall have made oath of his intention to become a citizen thereof, who shall have invented any new art, machine, or improvement thereof, and shall desire further time to mature the same, may, on paying to the credit of the Treasury, in manner as provided in the ninth section of this act, the sum of twenty dollars, file in the Patent Office a caveat, setting forth the design and purpose thereof, and its principal and distinguishing characteristics, and praying protection of his right, till he shall have matured his invention; which sum of twenty dollars, in case the person filing such caveat shall afterwards take out a patent for the invention therein mentioned, shall be considered a part of the sum herein required for the same. And such caveat shall be filed in the confidential archives of the office, and preserved in secrecy. And if application shall be made by any other person, within one year from the time of filing such caveat, for a patent of any invention with which it may in any respect interfere, it shall be the duty of the Commissioner to deposite the description, specifications, drawings, and model, in the confidential archives of the office, and to give notice (by mail) to the person filing the caveat of such application, who shall within three months after receiving the notice, if he would avail himself of the benefit of his caveat, file his description, specifications, drawings and model; and if, in the opinion of the Commissioner, the specifications of claim interfere with each other, like proceedings may be had in all respects as are in this act provided in the case of interfering applications."—Act of 1836, sec. 12.

EXTENSION OF A PATENT BEYOND THE FOURTEEN YEARS.

SEC. 39. Section eighteen enacts, "That whenever any patentee of an invention or discovery shall desire an extension of his patent beyond the term of its limitation, he may make application therefor, in writing, to the Commissioner of the Patent Office, setting forth the grounds therefor; and the Commissioner shall, on the applicant's paying the sum of forty dollars to the credit of the Treasury, as in the case of an original application for a patent, cause to be published in one or more of the principal newspapers in the city of Washington, and in such other paper or papers as he may deem proper, published in the section of country most interested adversely to the extension of the patent, a notice of such application, and of the time and place when and where the same will be considered, that any person may appear and show cause why the extension should not be granted. And the Secretary of State, the Commissioner of the Patent Office, and the Solicitor of the Treasury, shall constitute a board to hear and decide upon the evidence produced before them, both for and against the extension, and shall sit for that purpose at the time and place designated in the published notice thereof. The patentee shall furnish to said board a statement, in writing, under oath, of the ascertained value of the invention, and of his receipts and expenditures, sufficiently in detail to exhibit a true and faithful account of loss and profit in any manner accruing to him from and by reason of said invention. And if, upon a hearing of the matter, it shall appear to the full and entire satisfaction of said board, having due regard to the public interest therein, that it is just and proper that the term of a patent should be extended, by reason of the patentee, without neglect or fault on his part, having failed to obtain, from the use and sale of his invention, a reasonable remuneration for the time, ingenuity, and expense bestowed upon the same, and the introduction thereof into use, it shall be the duty of the Commissioner to renew and extend the patent, by making a certificate thereon of such extension, for the term of seven years from and after the expiration of the first term; which certificate of said board of their judgment and opinion as aforesaid, shall be entered on record in the Patent Office; and thereupon, the said patent shall have the same effect in law as though it had been originally granted for the term of twenty-one years; and the benefit of such renewal shall extend to assignees and grantees of the right to use the thing patented to the extent of their respective interests therein: *Provided, however*, That no extension of a patent shall be granted, after the expiration of the term for which it was originally issued.

FEES PAYABLE AT THE PATENT OFFICE.

SEC. 40. All fees must be paid in advance—the amount fixed by law; except in the case of drawings, the expense of which will be communicated on application for the same.

SEC. 41. Every applicant must pay into the Treasury of the United States, or into the Patent Office, or into any of deposite banks, a deposite to the credit of the Treasurer, on presenting his petition or application, as follows:

SEC. 42. If a citizen of the United States, as a patent fee	$30 00
SEC. 43. If a foreigner, who has resided in the United States one year next preceding the application for a patent, and shall have made oath of his intention to become a citizen	30 00
SEC. 44. If a subject of the Sovereign of Great Britain	500 00
SEC. 45. All other foreigners	300 00
SEC. 46. On entering a caveat	20 00
SEC. 47. On entering an application for an appeal from the decision of the Commissioner	25 00
SEC. 48. On extending a patent beyond the fourteen years	40 00
SEC. 49. For adding to a patent the specification of a subsequent improvement	15 00
In case of re-issues for every additional patent	30 00
SEC. 50. On surrender of an old patent, to be re-issued, to correct a mistake of the patentee	15 00
SEC. 51. For a disclaimer	10 00
SEC. 52. For copies of patents, or any other paper on file, for each 100 words	10

SEC. 53. For copies of drawings, a reasonable sum, in proportion to the time occupied in making the same.

SEC. 54. Communications to and from the Patent Office are free of postage.

SEC. 55. All fees under five dollars, if sent to the Commissioner of Patents, should be transmitted in specie.

SEC. 56. It is recommended to make a deposite in a specie-paying deposite bank, of the fee for a patent or other application, and to remit the certificate. Where this cannot be done without much inconvenience, gold may be remitted by mail free of postage, at the risk of the correspondent.

SEC. 57. In case of deposite made in the deposite banks, a duplicate receipt should be taken, stating by whom the payment is made, and for what object. The particular invention should be referred to, to enable the applicant to recover back the twenty dollars in case of the withdrawal of the petition. The certificate of deposite may be made in the following form:

SEC. 58. *Bank of*

The Treasurer of the United States has credit at this office for dollars in specie, deposited by of the town of , in the county of , and State of , the same being for a patent [*or whatever the object may be*] for a steam-boiler.

List of Banks which are authorized to receive Patent fees on account of the Treasury of the United States, and to give receipts or certificates of deposite therefor, viz:

Commercial Bank Portsmouth, N. H.; Bank of Montpelier, Vt.; Merchants' Bank, Boston, Massachusetts; City Bank, New Haven, Conn.; Arcade Bank, Providence, Rhode Island; Farmers' and Mechanic's Bank, Hartford, Ct.; Mechanic's and Farmer's Bank, Albany; Albany City Bank, Albany; Bank of Commerce, New York,; N. Y. Bank of America, N. Y.; American Exchange Bank, N. Y.; Merchants' Bank, N. Y.; Commercial Bank, Albany, N. Y.; Philadelphia Bank, Philadelphia, Penn.; Exchange Bank, Pittsburgh, Penn.; Bank of Pittsburgh, Pittsburgh, Penn. Bank of Baltimore, Baltimore, Md.; Bank of Washington, Washington, D. C.; Bank of the Metropolis, Washington, D. C.; Bank of Virginia, Richmond, Virginia; Exchange Bank of Virginia, Norfolk, Va.; Southwestern Railroad Bank, Charleston, S. C.; Branch Bank of Cape Fear, Raleigh, N. C.; Planters' Pank of Georgia, Savannah, Georgia; Bank of Mobile, Mobile, Alabama; Branch Bank of Alabama, Huntsville, Ala.; Bank of Louisiana, New Orleans, Louisiana; Union Bank of Tennessee, Nashville, Tenn.; Louisville Savings Institution, Louisville, Kentucky; The Ohio Life Insurance and Trust Company's Bank, Cincinnati, Ohio; Clinton Bank, Columbus, Ohio; Bank of Sandusky, Sandusky, Ohio; Bank of Missouri, St. Louis, Missouri; Michigan Insurance Company, Detroit, Mich.; Union Bank of Louisiana, New Orleans, La.

Any person wishing to pay a patent or other fee, may deposite it with either of the banks above-named, and forward the receipt or certificate to this office, as evidence thereof.

Money sent by mail must be at the risk of the person sending the same.

Sec. 59. N. B.—The Patent Office does not make original drawings to accompany applications for patents, and furnishes copies of the same only after the patent is completed. Draughtsmen in the city of Washington are always ready to make drawings at the expense of the patentees.

ON RECOVERING BACK MONEY PAID FOR A PATENT NOT TAKEN OUT.

Sec. 60. When an applicant, who is a citizen or a resident alien, relinquishes or abandons the application for a patent, he must petition the Commissioner of Patents, stating the abandonment or withdrawal of his application; in which case twenty dollars will be repaid. If this withdrawal be of a foreign patent, two-thirds of the fee is to be returned.

Sec. 61. In case of withdrawing a petition, the model deposited is by law retained.

Sec. 62. Whenever a patent is refused by the Commissioner, on the ground that the alleged invention is not new, or interferes with an existing patent, or is not sufficiently useful and important, or in case of two or more interfering applications, the party or parties against whom the Commissioner has decided, can have remedy by an "appeal to the Chief Justice of the District Court of the United States for the District of Columbia," by giving notice thereof to the Commissioner, and filing in the Patent Office, within such time as the Commissioner shall appoint, his reasons of appeal, specifically set forth in writing, and also paying into the Patent Office, to the credit of the patent fund, the sum of twenty-five dollars. And it shall be the duty of said Chief Justice, on petition, to hear and determine all such appeals, and to revise such decisions in a summary way, on the evidence produced before the Commissioner, at such early and convenient time as he may appoint, first notifying the Commissioner of the time and place of hearing, whose duty it shall be to give notice thereof to all parties who appear to be interested therein, in such manner as said Judge shall prescribe. The Commissioner shall also lay before the said Judge all the original papers and evidence in the case, together with the grounds of his decision, fully set forth in writing, touching all the points involved by the reasons of appeal, to which the revision shall be confined. And at the request of any party interested, or at the desire of the Judge, the Commissioner, and the Examiners in the Patent Office, may be examined, under oath, in explanation of the principles of the machine or other thing, for which a patent, in such case, is prayed for. And it shall be the duty of said Judge, after a hearing of any such case, to return all the papers to the Commissioner, with a certificate of his proceedings and decision, which shall be entered of record in the Patent Office; and such decision, so certified, shall govern the further proceedings of the Commissioner in such case: *Provided, however*, That no opinion or decision of the Judge in any such case, shall preclude any person interested in favor or against the validity of any patent which has been or may hereafter be granted, from the right to contest the same in any judicial court, in any action in which its validity may come in question.

REMEDY IN EQUITY FOR PATENTEES.

Sec. 63. In cases where patents are refused for any reasons whatever, or when there shall be two interfering patents, remedy can be had from the decisions of the Commissioner of Patents, or from the Chief Justice of the United States Court for the District of Columbia, by bill in equity; and the court having cognizance thereof, on notice to adverse parties (and when there shall be no adverse party, a copy of the bill shall be served upon the Commissioner of Patents, when the whole of the expenses of the proceedings shall be paid by the applicant, whether the final decision shall be in his favor or otherwise) and other due proceedings had, may adjudge and declare either the patents void in the whole or in part, or inoperative and invalid in any particular part or portion of the U. States, according to the interest which the parties to such suit may possess in the patent or the inventions patented, and may also adjudge that such applicant is entitled, according to the principles and provisions of this act, to have and receive a patent for his invention, as specified in his claim, or for any part thereof, as the fact of priority of right or invention shall, in any such case, be made to appear. And such adjudication, if it be in favor of the right of such applicant, shall authorize the Commissioner to issue such patent, on his filing a copy of the adjudication, and otherwise complying with the requisitions of this act: *Provided, however*, That no such judgment or adjudication shall affect the rights of any person, except the parties to the action, and those deriving title from or under them, subsequent to the rendition of such judgment.

ON FILING THE SPECIFICATION AND DRAWING AS A CAVEAT.

Sec. 64. "Whenever the applicant shall request it, the patent shall take date from the time of filing the specification and drawings, not however, exceeding six months prior to the actual issuing of the patent; and, on like request, and the payment of the duty herein required, by any applicant, his specification and drawings shall be filed in the secret archives of the office, until he shall furnish the model, and the patent be issued, not exceeding the term of one year; the applicant being entitled to notice of interfering applications."—Act of 1836, sec. 8.

Sec. 65. A full description of the invention is required, to enable the Commissioner of Patents to judge of interferences.

Sec. 66. All applications will be examined, and patents issued, in the order of time in which the proper documents are completed.

EXHIBITION OF MODELS AND MANUFACTURES.

Sec. 67. Models of unpatented machines, specimens of compositions and of fabrics, and other manufactures, or works of art, will be received and arranged in the national repository of the Patent Office, as soon as the new building is finished.

Sec. 68. The personal attendance of an applicant at the Patent Office, to obtain a patent, is unnecessary. The business can be done by correspondence, (free of postage,) or by attorney.

OATHS OR AFFIRMATIONS.

Sec. 69. Any magistrate, having general authority to administer oaths, is qualified to take depositions in matters relating to patents.

Forms which may be used in making applications at the Patent Office.

FORM OF PETITION.

Sec. 70. To the Commissioner of Patents:

The petition of Sebastian Cabot, of Cabotville, in the county of Hampden, and State of Massachusetts.

Respectfully represents:

That your petitioner has invented a new [and improved mode of preventing steam-boilers from bursting,] which he very believes has not been known or used prior to the invention thereof by your petitioner. He therefore prays that letters patent of the United States may be granted to him therefor, vesting in him and his legal representatives the exclusive right to the same, upon the terms and conditions expressed in the act of Congress in that case made and provided; he having paid thirty dollars into the Treasury, and complied with other provisions of the said act.

SEBASTIAN CABOT.

FORM OF SPECIFICATION.

Sec. 71. To all whom it may concern:

Be it known that I, Sebastian Cabot, of Cabotville, in the county of Hampden, and State of Massachusetts, have invented a new and improved mode of preventing steam-boilers from bursting, and I do hereby declare that the following is a full and exact description:

The nature of my invention consists in providing the upper part of a steam-boiler with an aperture in addition to that for the safety-valve; which aperture is to be closed by a plug, or disk of alloy, which will fuse at any given degree of heat, and permit the steam to escape, should the safety-valve fail to perform its functions.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation: I construct my steam-boiler in any of the known forms, and apply thereto gauge-cocks, a safety-valve, and the other appendages of such boilers; but, in order to obviate the danger arising from the adhesion of the safety-valve, and from other causes, I make a second opening in the top of the boiler, similar to that made for the safety-valve, as shown at A, in the accompanying drawing; and in this opening I insert a plug or disk of fusible alloy, securing

it in its place by a metal ring and screws, or otherwise. This fusible metal I, in general, compose of a mixture of lead, tin, and bismuth, in such proportions as will insure its melting at a given temperature, which must be that to which it is intended to limit the steam, and will, of course, vary with the pressure the boiler is intended to sustain. I surround the opening containing the fusible alloy by a tube B, intended to conduct off any steam which may be discharged therefrom. When the temperature of the steam, in such a boiler, rises to its assigned limit, the fusible alloy will melt and allow the steam to escape freely, thereby securing it from all danger of explosion.

What I claim as my iuvention, and desire to secure by letters patent, is the application to steam-boilers of a fusible alloy, which will melt at a given temperature, and allow the steam to escape, as herein described; using for that purpose any metallic compound which will produce the intended effect. SEBASTIAN CABOT.

Witness: { JOHN DOE, RICHARD ROE.

SEC. 72. When the application is for a machine, the specification should commence thus:

Be it known that I, of , in the county of , and State of , have invented a new and useful machine for—[stating the use and title of the machine; and if the application is for an improvement, it should read thus: a new and useful improvement on a, or on the, machine, &c.]—and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which figure 1 is a perspective view, figure 2 a longitudinal elevation, figure 3 a transverse section, &c. [thus describing all the sections of the drawings, and then referring to the parts by letters.] Then follows the description of the construction and operation of the machine, and ending with the claim, which should express the nature and character of the invention, and identify the part or parts claimed separately or in combination. If the specification is for an improvement, the original invention should be disclaimed, and then the claim confined to the improvement.

FORM OF OATH.

SEC. 73. COUNTY OF HAMPDEN, *State of Massachusetts, ss:*

On this day of , 183 , before the subscriber, a , personally appeared the within named Sebastian Cabot, and made solemn oath [or affirmation] that he verily believes himself to be the original and first inventor of the mode herein described for preventing steam boilers from bursting, and that he does not know or believe the same was ever before known or used; and that he is a citizen of the United States.

Signed, A. D.

FORM OF WITHDRAWAL.

SEC. 74. To the Commissioner of Patents:

SIR: I hereby withdraw my application for a patent for improvements in the steam-boiler, now in your office, and request that twenty dollars may be returned to me agreeably to the provision of the act of Congress authorizing such withdrawal.

SEBASTIAN CABOT.

CABOTVILLE, MASS. March 1, 1838.

N. B.—If you withdraw your application, please enclose a receipt in the following form:

Received of the Treasurer of the United States, per Hon. Edmund Burke, Commissioner of Patents, twenty dollars, being the amount refunded on withdrawing my application for a patent for

FORM OF SURRENDER OF A PATENT FOR RE-ISSUE.

SEC. 75. To the Commissioner of Patents:

The petition of Sebastian Cabot, of Cabotville, in the county of Hampden, and State of Massachusetts,

RESPECTFULLY REPRESENTS:

That he did obtain letters patent of the United States for an improvement in the boilers of steam-engines, which letters patent are dated on the first day of March, 1835. That he now believes that the same is inoperative and invalid, by reason of a defective specification, which defect has arisen from inadvertence and mistake. He therefore prays that he may be allowed to surrender, and he hereby does surrender the same, and request that new letters patent may issue to him for the same invention, for the residue of the period for which the original patent was granted, under the amended specification herewith presented; he having paid fifteen dollars into the Treasury of the United States, agreeably to the requirements of the act of Congress in that case made and provided.

SEBASTIAN CABOT.

FORM OF ASSIGNMENT OF A RIGHT IN A PATENT.

SEC. 76. WHEREAS, I, Sebastian Cabot, of Cabotville, in the county of Hampden, and State of Massachusetts, did obtain letters patent of the United States for certain improvements in steam engines, which letters patent bear date the first day of March, 1835; and whereas, John Doe, of Cabotville aforesaid, is desirous of acquiring an interest therein: NOW THIS INDENTURE WITNESSETH, that, for and in consideration of the sum of two thousand dollars, to me in hand paid, the receipt of which is hereby acknowledged, I have assigned, sold, and set over, and do hereby assign, sell, and set over, all the right, title, and interest, which I have in the said invention, as secured to me by said letters patent, for, to, and in the several States of New York, New Jersey, and Pennsylvania, and in no other place or places. The same to be held and enjoyed by the said John Doe for his own use and behoof, and for the use and behoof of his legal representatives, to the full end of the term for which said letters patent are or may be granted, as fully and entirely as the same would have been held and enjoyed by me, had this assignment and sale not have been made.

In testimony whereof, I have hereunto set my hand, and affixed my seal, this first day of March, 1838.

Witness: { A. B., C. D. SEBASTIAN CABOT, [L. S.]

FORM OF DISCLAIMER.

SEC. 77. To the Commissioner of Patents:

The petition of Sebastian Cabot, of Cabotville, in the county of Hampden, and State of Massachusetts,

RESPECTFULLY REPRESENTS:

That he has, by assignment, duly recorded in the Patent Office, become the owner of a right for the several States of Massachusetts, Connecticut, and Rhode Island, to certain improvements in the steam engine, for which letters patent of the United States were granted to John Doe, of Boston, in the State of Massachusetts, dated on the first day of March, 1835. That he has reason to believe that, through inadvertence and mistake, the claim made in the specification of said letters patent is too broad, including that of which the said patentee was not the first inventor. Your petitioner, therefore, hereby enters his disclaimer to that part of the claim in the aforenamed specification, which is in the following words, to wit: "I also claim the particular manner in which the piston of the above described engine is constructed, so as to insure the close fitting of the packet thereof to the cylinder, as set forth; which disclaimer is to operate to the extent of the interest in said letters patent vested in your petitioner, who has paid ten dollars into the Treasury of the United States, agreeably to the requirements of the act of Congress in that case made and provided.

SEBASTIAN CABOT.

When the disclaimer is made by the original patentee, it must, of course, be so worded as to express that fact.

FORM OF CAVEAT.

SEC. 78. To the Commissioner of Patents:

The petition of Sebastian Cabot, of Cabotville, in the county of Hampden, and State of Massachusetts,

RESPECTFULLY REPRESENTS:

That he has made certain improvements in the mode of constructing the boilers of steam engines; and that he is now engaged in making experiments for the purpose of perfecting the same, preparatory to his applying for letters patent therefor. He therefore prays that the subjoined description of his invention may be filed as a CAVEAT, in the confidential archives of the Patent Office, agreeably to the provisions of the act of Congress in that case made and provided; he having paid twenty dollars into the Treasury of the United States, and otherwise complied with the requirements of the said act. SEBASTIAN CABOT.

CABOTVILLE, March 1, 1838.

SEC. 79. Here should follow a description of the general principles of the invention, so far as it has been completed.

FORM FOR ADDITION OF NEW IMPROVEMENTS.

SEC. 80. To the Commissioner of Patents:

The petition of Sebastian Cabot, of Cabotville, in the county of Hampden, and State of Massachusetts,

RESPECTFULLY REPRESENTS:

That your petitioner did obtain letters patent of the United States for an improvement in the boilers of steam engines, which letters patent are dated on the first day of March, 1835; that he has since that date, made certain improvements on his said invention; and that he is desirous of adding the subjoined description of his said improvements to his original letters patent agreeably to the provisions of the act of Congress in that case made and provided; he having paid fifteen dollars into the Treasury of the United States, and otherwise complied with the requirements of the said act. SEBASTIAN CABOT.

SEC. 81. FORM OF ASSIGNMENT BEFORE OBTAINING LETTERS PATENT AND TO BE RECORDED PREPARATORY THERETO.

WHEREAS, I, Sebastian Cabot, of Cabotville, in the county of Hamp-

den, State of Massachusetts, have invented certain new and useful improvements in the boilers of steam engines, for which I am about to make application for letters patent of the United States; and whereas John Doe, of Cabotville, aforesaid, has agreed to purchase from me all the right, title, and interest which I have, or may have, in and to the said invention, in consequence of the grant of letters patent therefor, and has paid to me, the said Cabot, the sum of five thousand dollars, the receipt of which is hereby acknowledged. Now, this indenture witnesseth, that for and in consideration of the said sum to me paid, I have assigned and transferred, and do hereby assign and transfer, to the said John Doe, the full and exclusive right to all the improvements made by me, as fully set forth and described in the specification which I have prepared and executed, preparatory to the obtaining of letters patent therefor. And I do hereby authorize and request the Commissioner of Patents to issue the said letters patent to the said John Doe, as the assignee of my whole right and title thereto, for the sole use and behoof of the said John Doe and his legal representatives.

In testimony whereof, I have hereunto set my hand and affixed my seal, this first day of March, 1838.

Witness: { A. B., C. D. } SEBASTIAN CABOT. [SEAL.]

SEC. 82. FORM OF OATH ON RESTORING DRAWINGS, OR SKETCHES FROM WHICH DRAWINGS MAY BE MADE, TO REPLACE THE ORIGINALS DESTROYED IN THE OFFICE.

COUNTY OF HAMPDEN, *State of Massachusetts, ss:*

On this first day of March, 1838, before the subscriber, a personally appeared Sebastian Cabot, of Cabotville, in the State of Massachusetts, and made solemn oath that he is the inventor [*or is interested in the invention as administrator*, &c.] of an improved mode of preventing the explosion of steam-boilers, for which letters patent of the United States were granted to him, dated the first day of January, 1835, and that the annexed drawing [*or sketch*] is, as he verily believes, a true delineation of the invention described in the said letters patent.

SEC. 83. If the following questions can be answered affirmatively, before transmitting the papers, few applications will be returned for correction of omissions:

1. Is the fee transmitted?
2. Is the petition signed, and addressed to the Commissioner of Patents?
3. Is the specification signed, and witnessed by two witnesses?
4. Are the drawings described, and referred to in the specification? If not, are they signed before two subscribing witnesses, and are they accompanied with written references?
5. Are duplicate drawings sent?
6. Has the inventor made oath to his being a citizen, and that his invention is new, &c.?
7. Does the specification contain a specific claim?
8. If an alien and resident, is this affirmed and sworn to?
9. Has the model been sent, and how?
10. Is the name of the inventor durably affixed to the same?
11. In case of re-issue, is the old patent surrendered?
12. Has the oath of invention been renewed, before appealing from the decision of the Commissioner?
13. Have the fees been remitted in coin, or by certificate of deposite?
14. In case of re-issue, disclaimer, addition of an improvement, or patent for an improvement on an existing patent to inventor, assignee, or possessor of the original patent, have model and drawings of the original patent (if granted before the 15th of December, 1836,) been transmitted?

INFORMATION

UNDER THE ACT OF AUGUST 29, 1842.

ART. 1. This act authorizes the Treasurer of the United States to repay any money which has been paid into the Treasury by actual mistake, as for patent fees, thus precluding the necessity of special application to Congress for relief.

ART. 2. The privilege of renewal of lost patents is now extended to those *granted* before the fire of December, 1836. Heretofore it has been limited to those actually *lost* before the fire, thus excluding many lost subsequently, and before they were recorded anew in this office, leaving the inventor without remedy.

ART. 3. Protection is by this act extended to a *new* class of objects, viz: To new and original *Designs:*

—for a manufacture of metal and other materials;
—for the printing of woollen, silk, cotton, or other fabrics;
—for busts, statues, or bas relief, or composition in alto or basso relievo;
—for any impression or ornament, or to be placed on any article of manufacture in marble or other material;
—for any new and useful pattern, print, or picture, to be in any manner attached to, or fixed on, any article of manufacture;
—for any new or original shape or configuration of any article of manufacture; all such designs not being previously known or used by others.

ART. 4. American ministers, consuls, &c., residing abroad, may administer the oath required for applicants not resident in the United States. Heretofore such functionaries were not authorized to perform this act, thus subjecting applicants, in foreign countries, to much inconvenience.

ART. 5. The stamping or affixing the name of any patentee on any article without authority so to do, or the affixing the word *patent*, or *letters patent*, or the stamp, mark, or device of any patentee on any unpatented article, for the purpose of deceiving the public, is forbidden under a penalty of not less than one hundred dollars.

ART. 6. Patentees, or their assignees, are now required to affix the date of the patent on each article vended or offered for sale, under a like penalty—thus affording to the public notice of the duration of the patent. When the article is of such a nature that the date cannot be printed thereon, it should be affixed to the case or package containing it.

It will be observed that this act does not repeal or change the law under which patents have heretofore been granted, but is merely additional thereto—all patents, except for *designs*, being granted for fourteen years, and the fee, as hitherto, being thirty dollars.

Before the grant of any patent under this act, the application must be made by petition to the Commissioner of Patents, signed by the inventor.

He is also required to furnish a written description or specification of his invention or production, in which the same shall be fully and clearly described; such specification to be signed, witnessed by two witnesses, and verified by his oath or affirmation.

In all cases which admit of representation by drawings, the application must be accompanied by duplicate drawings and a specimen; and in other cases by duplicate specimens.

The provisions of the 6th section do not apply to Patents granted prior to the passage of this act.

Forms of application for Patents on Designs, under the act of August 29, 1842.

To the Commissioner of Patents:

The petition of Sebastian Cabot, of Cabotville, in the county of Hampden, and State of Massachusetts,

RESPECTFULLY REPRESENTS:

That your petitioner has invented or produced a new design or figure [to be stamped or printed on fabrics, which, when thus printed, are termed calicoes,] which he verily believes has not been known prior to the production thereof by your petitioner. He therefore prays that letters patent of the United States may be granted to him therefor, vesting in him and his legal representatives the exclusive right to the same, upon the terms and conditions expressed in the act of Congress in that case made and provided; he having paid fifteen dollars into the Treasury, and complied with other provisions of the said act.

SEBASTIAN CABOT.

SPECIFICATION.

To all whom it may concern:

Be it known that I, Sebastian Cabot, of Cabottville, in the county of Hampden, and State of Massachusetts, have invented or produced a new design or figure [to be printed on fabrics, which, when thus printed, are termed calicoes,] and I do hereby declare that the following is a full and exact description of the same.—[Here follows a description of the design or figure with reference to the specimen, or to a drawing of it, in all cases which admit of representation by drawings.]

The specification to conclude with declaring what the inventor or producer claims to be expressed in terms which will give the character of the design, &c.

FORM OF OATH.

COUNTY OF HAMPDEN, *State of Massachusetts, ss:*

On this day of 184 , before the subscriber, a personally appeared the within named Sebastian Cabot, and made solemn oath [or affirmation as the case may be] that he verily believes himself to be the original and first inventor or producer of the design for figures to be printed on fabrics which, when thus printed, are termed calicoes; and that he does not know or believe that the same was ever before known or used, and that he is a citizen of the United States. Signed, A. B.

The phraseology of the title of this act having misled many persons, it is proper to add that it is an act in addition to the act of July 4, 1836, by which act all acts and parts of acts before made were *then* repealed. The title of the act of August 29, 1842, therefore, merely recites the title of the act of 1836.

EDMUND BURKE,
PATENT OFFICE, *May 7*, 1845. Commissioner of Patents.

All Ccommunications should be addressed to the Commissioner of Patents.

In consequence of the numerous applications to this office for information, founded on brief descriptions of inventions, and asking, in any given case, whether there exists any thing like the invention described, and whether a patent can be had therefor, it has become necessary to furnish the explanation following as a general reply to such inquiries.

By the act of July 4, 1836, entitled "An act to promote the useful arts, and to repeal all acts and parts of acts heretofore made for that purpose," a principle entirely new was engrafted upon the system, under which patents had been previously granted.

Under the provisions of this act, it was made the duty of the Commissioner of Patents, on the receipt of any application for a patent, to institute "an examination of the alleged new invention or discovery," with a view to determine whether the same had been before "invented or discovered by any other person in this country," "or patented, or described in any printed publication, in this or any foreign country." Thus was the grant of patents in future restricted to such "inventions or discoveries" as were *new* in the most absolute sense of the term; and a very laborious and responsible duty imposed upon this office. In aid of the solution of the question of *novelty*, thus raised on every application, the applicant was required to furnish a full and clear description of his invention, signed, witnessed, and verified by his oath, accompanied by a model and drawings of the same; all being deemed necessary in order to illustrate his claim to a patent. Furnished with these illustrations, the office was then required to go into a rigorous and extended examination, taking in the whole range of history on the given subject, whether its evidences were to be found in patents granted, caveats filed, or descriptions published, in this or in any foreign country, in any period of time.

In the conduct of these examinations, it is necessary to keep in constant and laborious employment a number of persons specially selected for their knowledge and skill in the arts; to refer with guarded care to caveats filed in the secret archives of the office, and which can only come into view on such occasions; to patents already granted, and to such works on the arts as have been published here or elsewhere; and also to keep pace with the current of invention throughout the world, by a constant and copious supply of such publications in this country and in Europe as are devoted to this object.

It will readily be seen that this office cannot undertake to respond to the numerous inquiries constantly addressed to it, whether such or such an invention can be new, and whether a patent can be obtained for it. Because, 1st. Every such inquiry involves the *whole question* of *novelty;* and before the office could express, or even form, an opinion, would require the same range of rigorous examination as is now required by law on a regular application for a patent, and this, too, without the necessary illustrations; such inquiries being based on mere and usually very imperfect general descriptions; while, in the case of application for patents, the law requires that the office shall have the aid, not only of clear and full description, under oath, but also accurate drawings and models, before it shall decide the question whether, in any given case, the invention be *new*, &c.

2d. The attempt to do so would effectually interrupt the appropriate business of the office, and be a direct infringement on the rights of those who apply for patents; as the regular examinations of their applications must necessarily be suspended while the examinations required, in order to frame such answers, were being made.

3d. Every such inquiry does, in effect, require this office to prejudge a case before such case is presented; or, in other words, the inquirer asks of the office to decide upon his invention before he has done that which the law requires he shall do, in order to obtain such decision.

4th. The law has made no provision for such services. It is, therefore, no part of the legitimate duty of this office.

It is hoped that this explanation will prove satisfactory to all, and that it will be distinctly understood, that, in declining to respond to the class of inquiries above stated, this office acts under the mere necessity of the case, and not from any disposition to withhold information.

The records and models of the office are always open to inspection, and copies can readily be furnished on receipt of the fee required by law.

MODELS.

Sec. 84. *If deposited with any of the following agents, will be forwarded to the Patent Office, free of expense.*

The collector of the Port of Portsmouth, New Hampshire.
" " " Portland, Maine.
" " " Burlington, Vermont.
" " " Providence, Rhode Island.
R. H. Eddy, agent at Boston, Massachusetts.
The surveyor at Hartford, Connecticut.
Edgar Irving, agent, custom-house, New York.
The collector of the Port of Philadelphia, Pennsylvania.
" " " Baltimore, Maryland.
" " " Richmond, Virginia.
" " " Charleston, South Carolina.
" " " Savannah, Georgia.
" " " New Orleans, Louisiana.
The Collector of the Port of Detroit, Michigan.
" " " Buffalo, New York.
The surveyor at St. Louis, Missouri.
The collector of the Port of Cleaveland, Ohio.
The surveyor at Pittsburg, Pennsylvania.
" " " Cincinnati, Ohio.
" " " Louisville, Kentucky.

Sec. 85. The transmission of models by the agents extends to those for new applications, as well as those restored in consequence of the destruction of the originals.

Sec. 86. N. B. *Patentees*, and the public in general, are urged to use their influence to aid the office in restoring the records of all patents and assignments on record before the fire in December, 1836. The same cannot be used in evidence unless *so recorded anew*. No expense is incurred. The papers are received and transmitted by mail.

EDMUND BURKE,
Commissioner of Patents.

REQUEST.

Congress having authorized the distribution of seeds through this office a transmission to this place of any rare and useful seeds may confer a great benefit on the community, and will, so far as practicable, be reciprocated by the Commissioner of Patents. A history of the seed transmitted, together with the place of production, is respectfully solicited.

INSTRUCTIONS TO APPLICANTS FOR PATENTS AND OTHERS.

Applicants are examined in the order of their reception; but every application before the examiners, will bring up for action any other cases belonging to the same class, which may at that time be before the office.

Rejected applications may be reconsidered at the request of the applicant, and explanations whether verbal or in writing, may be at any convenient time received by the examiners; but final action upon such cases cannot be had until they come up in their turn as cases presented anew.

In case specifications and drawings should be found defective, they are returned to the applicants with instructions to amend. When returned to the office they are again examined, the examination in such cases taking precedence of all new cases on hand at the time of their reception. But if on such examination it should be found that the instructions to amend have been disregarded, or not properly attended to, the papers are again returned to the applicant, and upon their second return to the office, the examination of such papers is delayed until all the business on hand at the time of their reception is disposed of.

When papers are thus returned to applicants for amendment, should they find it necessary or deem it important to prepare a new document, in order to make suitable amendments, *the original papers must be returned to the office, together with the amended or new papers*, otherwise examination upon such cases will be delayed until the original papers are received by the office.

After an application has been examined, no alteration made in the character of the invention can be considered under the same fee; but such alterations will require a separate fee, papers. &c., before examination can be had.

In general, if any addition is to be made to an invention duly before the office, or any change in its character, the applicant must withdraw and file his application anew.

When an application has been *finally decided*, the office will retain the original papers, allowing the applicant to obtain copies thereof.

EDMUND BURKE,
Commissioner of Patents.

Patent Office, *July* 30, 1845.

EXTENSION OF PATENTS.

[CIRCULAR.]

PATENT OFFICE, June 21, 1845.

THE undersigned, constituted by law a board to decide upon applications for the extension of patents, have adopted the following suggestions and rules, for the benefit of those persons who may hereafter apply for extensions.

The questions which arise on each application for an extension are—

1. Is the invention *novel?*
2. Is it *useful?*
3. Is it *valuable* and *important* to the public?
4. Has the inventor been *adequately remunerated* for his time and expense in originating and perfecting it?
5. Has he used due diligence in introducing his invention into general use?

The two first questions will be determined upon the result of an examination in the Patent Office; as will also the third, to some extent.

To enable the board to come to a correct conclusion in regard to the third point of inquiry, the applicant should, if possible, procure the testimony of persons disinterested in the invention, which testimony should be taken under oath.

In regard to the fourth and fifth points of inquiry, in addition to his own oath showing his receipts and expenditures on account of the invention, by which its value is to be ascertained, the applicant should show, by the testimony of disinterested witnesses on oath, that he has taken all reasonable measures to introduce his invention into general use, and that, without default or neglect on his part, he has failed to obtain from the use and sale of the invention a reasonable remuneration for the time, ingenuity, and expense bestowed on the same, and the introduction thereof into use.

The report of the examiner upon the novelty and utility of the invention, will be ready fifteen days before the day appointed for the hearing, which will be open for inspection at the Patent Office; copies of which will be furnished to all parties interested, if desired, on payment of the usual fees for copies.

In case of opposition by any person to the extension of a patent, both parties may take testimony, each giving reasonable notice to the other of the time and place of taking said testimony, which shall be taken according to the rules prescribed by the Commissioner of Patents in cases of interference.

All arguments submitted to the board must be in writing.

In conclusion, the undersigned would remark, generally, that a monopoly of his invention is secured by law to the inventor for the term of fourteen years. This is done with a view to compensate him for his time and expense in originating and perfecting it. At the end of the time for which his patent runs, his monopoly should cease and the invention become public property, unless he can show good reasons to the contrary. The presumption is always against his application; and if he cannot show that his invention is novel, useful, valuable, and important to the public, and that, having made all reasonable effort to introduce it into general use, he has not been adequately remunerated for his time and expenses in discovering and perfecting it, the board cannot grant an extension.

JAMES BUCHANAN,
Secretary of State.
EDMUND BURKE,
Commissioner of Patents.
S. BARTON.
Solicitor of the Treasury.

CONVENTION of AMERICAN INVENTORS & PATENTEES.

This body, composed of about one hundred persons, assembled in New York, for the purpose of making arrangements for annual meetings, to suggest and bring about such amendments in the Patent Laws of the United States as seem to be necessary, and to establish a centre, where all information on the subject of inventions, &c., may be obtained. Professor Renwick presided, assisted by a number of vice presidents. The True Sun states that the convention adjourned after adopting the following propositions submitted by a committee:

1. They propose that the 15th section of the act of 1836, be amended so as not to permit the defendant in a suit for damages, to prove that the patentee was not the original and first inventor, and that a patent shall be considered valid by the public until repealed by a process at law, and that positive injunctions issue until the patent is repealed.

2. That special judges be appointed, to be associated with the circuit judges in patent cases.

3. That the law be so amended as to define what shall constitute a prior use of an invention so as to defeat a patent, and to define an abandonment to the public.

4. In the re-issue of patents, that the law be made definite, so that the patentee shall have a right to claim more than is originally claimed, but within the limits of his description and drawings.

5. That the Commissioner of Patents and the Chief Examiners be made a committee to decide upon the extension of patents, and that all extensions shall accrue to the inventors unless they have assigned their right.

6. That provisions be made by Congress for the publication of patents.

7. That the library be enlarged, so as to insure full and speedy examinations by the patent officers.

8. That the compensation for the Chief Examiners be not less than $3000 per annum, and that the force be so increased as to secure speedy action upon all applications.

9. That a committee be appointed to submit the views of this Convention to the Commissioner of Patents, and solicit his official aid in carrying out these views; and to memorialise Congress upon these important subjects.

NATIONAL ASSOCIATION OF INVENTORS.

This valuable and intelligent body of men met again yesterday morning at the Mechanics' Lecture Room, at 10 o'clock.

HORATIO ALLEN, Esq., took the Chair, and stated that, as he could not attend all day, he moved that Col. CLARK take the Chair. This was carried.

Mr. ST. JOHN was then appointed Secretary.

Mr. ROOSEVELT, from the Committee to draft a Constitution and Laws, reported in part to the number of five articles; and the Committee having leave to sit again retired.

COL. CLARK asked Mr. Hotchkiss if he acted with the Committee.

Mr. HOTCHKISS said he feared this would be only a local Society for the benefit of New York.

Col. CLARK thought not: it was to be as wide as the whole country; he should not encourage it if it was not; the Society, however, would make this their centre, and have local Societies every where.

Mr. HOTCHKISS would act if he was pressed.

Mr. RUFUS DAWES then stated that he was authorized by the proprietors to present a new Journal, to be called "The American Journal of Improvements in the useful Arts, and Mirror of the Patent Office." One of its features might be thus stated:—This journal is to be devoted to the interests of Inventors, and will be found to be a free and sufficient medium at the seat of the General Government for the advocacy of their long neglected rights and privileges.

Mr. OWEN was going on to make a few remarks as to the enormous new productive power produced in the last fifty years by machinery and inventors. He said that with 2,500 men and women he obtained as much labor as formerly could be obtained with 600,000 men about fifty years ago; that is, human invention had created a power equal to three times the manual labor of the Globe.

Mr. ANDREWS moved a collection be taken up, to defray expenses; this was done, and with the collection of last evening, amounted to $35.

Mr. OWEN was then allowed ten minutes to detail a plan for the improvement of the Human race; he went on till he was cut short by the watch.

We must here give the remarks made by Chas. S. KELLER, Esq., in relation to the leading defects in the existing Patent Law. In the 15th Section of the Act of 1836, which allows the defendant in a suit for the infringement of a patent to set in the plea that the patentee is not the original and first inventor, or that the patent should not have been granted. This throws

all the difficulties on the back of the patentee, and the operation of this law is to expose the patent to endless litigation, against which the patentee cannot defend himself. Powerful companies array themselves against the patentee and at every new trial new defenders arise from every quarter which can only be resisted by a power of wealth equal to the defendants—a circumstance never yet attained by an inventor.

The patent laws of France, relieves the inventor from this difficulty by withholding from the defendant the plea of want of originality in a patentee, in a suit for damages for the infringement of the patent. That is to say, it places a patent for an invention in the same condition as the tenure of any other property—that the holder of the right, whilst it remains unrepealed, is the true proprietor. Under this system, any one desiring to make use of a patented invention which he believes to have been unjustly granted, must first apply to the Courts for the repeal of the patent; but if he fails to do this first, he is liable to the patentee for damages, and in a suit at law for the recovery of such damages no other defence can be advanced, than that the machine or process used by the defendant, is not substantially the same as the one patented.

The Committee reported a Constitution.

Dr. ANDREWS was not prepared as yet to adopt a Constitution. He wished and hoped to get something new out of such an intelligent body of men; and if we could get nothing new, then in Heaven's sake let us get the best we can. He moved that the Report be accepted for the purpose of having it under the control of the Association.

Mr GIFFORD was of the same opinion; he thought as this was to be a society for the whole of the United States, that the Constitution should be printed and sent to inventors all over the country; that they might deliberate carefully on it, and then meet at some future time, and take it up and act on it prudently. This is the most important society ever formed in the United States, and if you take this course you will have more inventors than will fill 4 such rooms. The Country is full of inventors—of gigantic minds full of genius and talent, and all they want is to have their rights protected.

Dr. JONES said that they must have a nucleus to begin with. The National Academy of Design began with five men. Some of the best Societies in the world began with six or eight men. There were fifty or sixty inventors present—enough to make a beginning and adopt a Consitution.

Mr. ROOSEVELT followed on the same side.

Mr. HORACE H. DAY thought that both parties might be suited. It was necessary to begin. We might go on now, and form a Society, and then adopt a Constitution at some future day.

Dr. A. JONES was willing that this Constitution should be submitted to a new Committee, who should send it all over the Country, and report on it, at some future meeting.

Mr. OWEN said that the British and Foreign Bible Society, began a meeting with only two men!—They voted for each other, one as President, and the other as Secretary.

Mr. ROOSEVELT would be discouraged if they did not adopt a Constitution now.

Dr. ANDREWS said that the leading feature of an inventor's character was that he was never discouraged. The man that invented patent leather went on until his last bed was sold; and he is now an independently rich man. No committee could in 24 hours *invent* a Constitution for the Inventors of the United States; why, it took five years to invent a thimble. He wanted the matter submitted to the great body of inventors of the United States.

Mr. H. H. DAY made a few very able remarks, tending to conciliate and reconcile the differences existing, and pressed strongly on the Society, the necessity of making a judicious and effective beginning at once. A few had gone to great personal trouble and expense to circulate advertisements and circulars to call together the inventors from all parts of the United States, and he trusted that they would not separate now without doing something effective and judicious for the benefit of inventors generally.

Dr. S. ANDREWS said the call was for the establishing of a centre of information, where may be gathered such facts and suggestions as will bear on the general interests of Inventors, which facts will receive at the next annual meeting, such attention as may be found now inexpedient. And we expressed a hope that this call would be widely responded to, and that such a representation of the interests of Inventors will be convened, as will make it the appropriate body to deliberate on such subjects, will give weight to the result of its deliberation and efficiency to its measures. He hoped that this plan of deliberation would be followed out by this and all future meetings.

Several other remarks were made.

Dr. ANDREWS moved that the report be laid on the table.

This was put and lost.

Dr. ANDREWS gave his views on the best mode of getting the views of the Inventors on forming this Society.

The meeting then commenced canvassing the subject article by article.

1. The name and style of the Association shall be the National Association of Inventors.

This was passed.

2. This Association shall consist solely of inventors.

This created considerable discussion, as to what constituted a legitimate inventor.

Mr. H. H. DAY wished to have it include all those who have obtained a patent which has not been repealed by a Court of Law.

Dr. ANDREWS wished none but legitimate inventors to be admitted; and a true inventor could easily be known; the true marks were on him; he could be known by the very table at which he sat, with his inkstand on it.

Mr. C. PARTRIDGE said, if this Society was to determine who are and who are not inventors, he wished to know who was to determine upon the claims of this body to decide on that question. Where are you going to stop?

Dr. ANDREWS—Where are you going to begin?

Mr. ROOSEVELT—Gentlemen, this is splitting hairs.

Dr. ANDREWS—Well, we want a machine for that. (Laughter and applause.)

Mr. H. H. DAY moved to amend the 2d article by adding—"and all persons who hold patents by assignment."

Mr. H. H. DAY suggested that, having now adopted a name, and also adopted a rule to say who shall form the Society, the meeting go to work, select its officers and their mode of appointment, so as to organize effectually.

Mr. PIRSSON moved that a committee be appointed to examine into the rest of the proposed Constitution, send copies to all inventors, and report hereafter, to a future meeting of this Society.

Mr. DAWES offered the following as a substitute,

Resolved, That so many of the Articles of the proposed Constitution, as relate to the election of the officers of this Association be now adopted and carried into effect; and that a Committee be appointed to draft a Constitution and circulate it throughout the United States, inviting replies to the same who shall invite a meeting of Inventors to assemble at New York, at such time as the Committee may appoint for the consideration and adoption of said Constitution.

This was carried.

Mr. PIRSSON then moved that a Committee of 10 should be appointed to nominate officers of the Society.

This was carried, and the following named as that Committee:

Mr. Pirsson, Mr. Mott, Mr. Gifford, Mr. Dawes, Mr. Roose-

velt, Mr. Hotchkiss, Mr. Day, Mr. Curtis, Mr. Barnum, Mr. Jennings.

They reported the following as the officers of the "Association of Inventors," until the Society is more fully established.

Prof. RENWICK, *President.*

Vice Presidents.

Thos. B. Stillman, N. Y.	Mr. M. Pierce, Conn.
Col. Clark, N. Y.	Mr. Morris, Penn.
Dr. Andrews, N. J.	Mr. H. M'Carty, Penn.
Mr. Thos. Rogers, N. J.	Mr. E. Hawley, Vt.

L. D. Gale, *Corresponding Secretary.*

J. J. Mapes, *Recording Secretary.*

Mr. Ewbank, *Treasurer.*

Mr. Day then moved, that in addition to the officers already appointed, a committee of ten be added, to constitute, with the officers, an Executive Committee, with power to act and add to their numbers:

The following were named as that Committee:

Mr. Pirsson, Mr. R. Dawes, Mr. Gifford, Gideon Hotchkiss, Mr. Day, Mr. Eli W. Blake, Mr. R. F. Loper, Mr. Elihu Blake, David Bruce, Mr. Barnum, Mr. Mott.

A vote of thanks to the gentlemen of the press was offered by Mr. H. H. Day and carried. Thanks to the Officers passed.

It was decided to meet at the Broadway House two weeks from to-day.

Thanks were passed to Messrs. Greer and Throop, of the American Patent Journal for their offer.

And the Association adjourned.

NATIONAL ASSOCIATION OF INVENTORS.

At a meeting of the National Association of Inventors, held at the Broadway House, on the 6th instant, pursuant to adjournment, the following Preamble and concluding Articles of the Constitution were adopted. President James Renwick in the Chair:

PREAMBLE:

The undersigned having associated themselves for the purpose of encouraging and protecting, as far as may be in their power, the rights of the inventors of new and useful improvements in the arts, have adopted the Constitution hereinafter set forth. They now submit it to those interested either as inventors or assignees in patent rights, and to all who desire that those who by their labor or ingenuity or expenditure of capital have promoted the best interests of the human family, shall enjoy an adequate remuneration.

In thus submitting it they invite all those who can with propriety be called Inventors, either as the patentees of new and useful machines and processes, or as the contrivers of important improvers in manufacturing industry, to unite with them in the prosecution of their laudable design, and solicit the aid and countenance of all cultivators of science, as well as of those who believe that an adequate encouragement is the surest mode of drawing forth such discoveries as will effectually increase the wealth and promote the happiness of the community.

The chief objects they have in view in thus uniting themselves in an Association may be briefly stated as follow:

First—To exert such an influence upon public feeling as may lead to improvements in the patent laws, and a benign interpretation of them for the purpose of rendering what is at present little more than a mockery a reality.

Second—To encourage and promote a spirit of useful inquiry into those branches of useful knowledge which contribute most to the comfort of the human race, and have the widest influence on their happiness.

Third—To promote harmony among inventors by providing for the appointment of arbitrators free from all possibility of bias, who may at less expense, and with greater knowledge of the subject, bring in a short time to an able adjustment questions which would otherwise be subjects of long and costly litigation before tribunals which by their inherent constitution cannot be reasonably expected to possess an intimate knowledge of the subjects usually made the basis of Patent Rights.

Fourth.—To afford counsel and advice to persons engaged in the search for useful discoveries, to give them such recommendations when their plans shall be approved as may aid them in obtaining the funds necessary to bring these inventions to the immediate test of experience, and finally to endeavor to accumulate funds where the means of bringing new machines and improvements into successful operations may be derived.

Fifth.—To keep an authentic record of the dates at which new discoveries are submitted to their secret Committee for the purpose of settling questions of Priority and securing reputation at least to the contrivers when a patent is not desired or the subject matter is not susceptible of being secured by a patent.

Sixth.—To provide a place of deposit for drawings and models where, in the centre of the business of the United States, praiseworthy inventions will have an opportunity of becoming extensively known.

Seventh.—To collect a library of reference of such works as may serve to aid inventors in perfecting their discoveries and prevent them from wasting their time and ingenuity in re-inventing what has become by lapse of time, the property of the world, or has been abandoned as useless.

Eighth.—To foster and extend the means of education practically to those who purpose to devote themselves to the practice of the Mechanical and Chemical Arts.

To reach all the objects thus set forth would be impracticable in the nascent state of any Association. Towards which of them it is their intention to direct their efforts in the first instance will appear from the Constitution now submitted, and however feeble may be their attempts, they venture to hope that their objects are of so praiseworthy a character that they must at no distant period, secure such encouragement as will enable the Association to bring its plans into full and successful operation.

[Here follows the names of the Officers, Committees and Members of the Association.]

CONSTITUTION

OF THE

NATIONAL ASSOCIATION OF INVENTORS.

Article 1.—The name and style of this Association shall be The National Association of Inventors.

Art. II.—Membership in this Association shall be confined solely to inventors.

Art. III.—The administration shall be in the hands of a President and two Vice Presidents for each State of the United States, in which inventors meet. The President to be a resident of the city of New York, with a Corresponding and Recording Secretary, a Treasurer, and such other officers and Committees as may be found necessary.

Art. IV.—An annual meeting of the Association shall be held in the City of New York, on the second Monday of October, and stated meetings shall be held monthly, at such times as may be appointed in the By-Laws.—Special meetings may be called at any time by the Recording Secretary upon the requisition in writing of five Members of the Association.

Art. V.—The election of Officers of this Association shall, except as hereinafter provided, be held at the Annual Meeting of the Association.

Art. VI.—No person shall, after the organization of the

association, be admitted as a member unless recommended as having been the author of some useful improvement in the Arts by two of the existing members, such recommendation shall be referred to be reported on to a Standing Committee of three members, to be chosen at the Annual meeting by ballots; and should the said Committee report the party so recommended as eligible, his admission shall be put to the question at the Annual or a stated meeting by ballot; and he shall not be elected unless he receive the votes of two-thirds of the members present at the meeting.

Persons residing abroad and distinguished for eminence in science or as inventors, may be chosen honorary or corresponding members of the Association, if recommended, approved and ballotted for, as in the case of members.

In addition to members there may be a class of Associates, to be chosen by ballot, from citizens of the United States, eminent in science, learned in the law of patents, or noted for the encouragement they have afforded to inventors.

Associates shall have the privilege of assisting at the meetings, and of joining in the discussions of the Associations; and such Associates as shall have contributed to the funds or property of the Association to the amount of one hundred dollars, shall in addition have the right of voting on all questions having reference to its pecuniary concerns.

Art. VII.—The Association will, whenever requested so to do by both parties to a dispute concerning priority of right to invention, appoint a Committee of arbitration in a mode to be provided for in the By-Laws.

Art. VIII.—The Association shall, whenever requested so to do, appoint a Committee to examine and report upon any new invention; and it shall be the duty of such Committee to give the applicant such aid and counsel as may be in their power, and in case they entertain a favorable opinion to report the same to the Association at a stated or special meeting for its approval. Such report shall be recorded, if approved, by the Association, and a copy furnished to the applicant.

The manner of appointing and mode of proceeding of such Committee shall be provided for in the By-Laws.

Art. IX.—The Association shall, at its Annual meeting, appoint a Standing Committee whose duty it shall be to hold in charge, and accessible to themselves alone and their successors in office, the secret archives of the Association.

In these secret archives inventors shall be at liberty to record or deposit under seal or otherwise, notice of their inventions, discoveries, improvements, and suggestions; and such shall be held as strictly confidential until the injunction to secresy be withdrawn by the inventor; and whensoever a party who shall have lodged such a notice, shall require evidence thereof, it shall be the duty of the said Committee to cause a certificate to be prepared, which shall be attested by the President and Recording Secretary, and shall set forth the subject of the notice, and the date of its record or deposit.

Art. X.—A Standing Committee shall be appointed at the Annual Meeting, whose duty it shall be to receive communications in relation to the working of the existing patent laws, or such as may be hereinafter enacted, and to report from time to time to the Association such suggestions for their amendment and improvement as the said communications may show to be necessary or expedient; and in case such suggestions be approved by the Association it shall be the duty of the officers to cause a petition to be presented to Congress praying, in the name of the Association, for such amendment and improvement.

Art. XI.—Until a charter shall be obtained from the Legislature of New York, a Board of Trustees shall be appointed at the Annual Meeting, in whom shall be vested all the property of the Association.

Art. XII.—The Association shall provide a suitable place in which may be deposited such models, drawings, and such other illustrations of inventions as the inventors may think proper to commit to its charge, with such books as may be presented to, or purchased by the Association.

And in addition to the officers hereinbefore provided for, one or more curators and a librarian, shall be chosen at the annual meeting, whose duty it shall be to have charge of the articles so committed or collected.

Art. XIII.—The members of this Association residing in any State other than the State of New York, shall have the power upon the call of any three of their number, and under the presidence of one of the Vice Presidents residing in said State, of organizing themselves into a branch society to aid the Association in the objects set forth in this Constitution. Such branch society may adopt their own Constitution and By-Laws, provided the same be not contrary to this Constitution. And may, at an annual meeting to be held, at least one month in advance of this Association, choose a President who shall be recognized as one of the Vice Presidents of this Association, provided for in the third Article of this Constitution.

It shall be the duty of such branch society to make annual reports of their condition and operation, to be laid before the Association at its annual meeting.

Art. XIV.—Members or Associates may be expelled by a vote of two-thirds of the members present at a stated meeting, held at least two months after charges have been preferred against them, on proof that they have committed any gross infringement of the constitution or By-Laws, or that they have been guilty of dishonorable conduct.

Parties against whom charges may be preferred, shall receive notice thereof, and of the meeting at which they are to be considered, and notice shall be addressed to all the members of the Association through the post office, informing them that the charges against the accused party are to be considered.

Art. XV.—Any officer of the Association may be liable to impeachment for misconduct in office, upon the exhibition of well authenticated charges against him; and should the charges be proven at a stated meeting of the Association, to be held at least two months after such charges are exhibited, may be deposed from office, or expelled from the Association, by a vote of two-thirds of the members present.

Art. XVI.—Every member shall pay on his admission into the association, an entrance fee of three dollars, and an annual contribution of two dollars, the latter of which shall be considered as due at the annual meeting, and such persons as shall fail three months thereafter to pay the said contribution unless in case of absence from the United States, shall be held to have resigned, and shall no longer be considered as members of this Association.

Members may commute their annual fee and become life members by the payment of fifteen dollars.

Art. XVII.—This Constitution may be amended at the annual meeting. Amendments shall be proposed only at stated meetings, and at least two months before the time of holding the annual meeting.

Art. XVIII.—An Executive Committee of five members shall be appointed at the annual meeting, of which the Recording Secretary shall be an ex-officio member, who among other duties, shall have power to fix the place and time of meeting, and no other meeting than the one at the time and place designated by them shall be considered as a meeting of this Association. Vacancies in this committee may be filled at any stated meeting.

L. D. GALE, *Rec. Secretary.*

☞ Applications for Membership may be made to the Secretaries.

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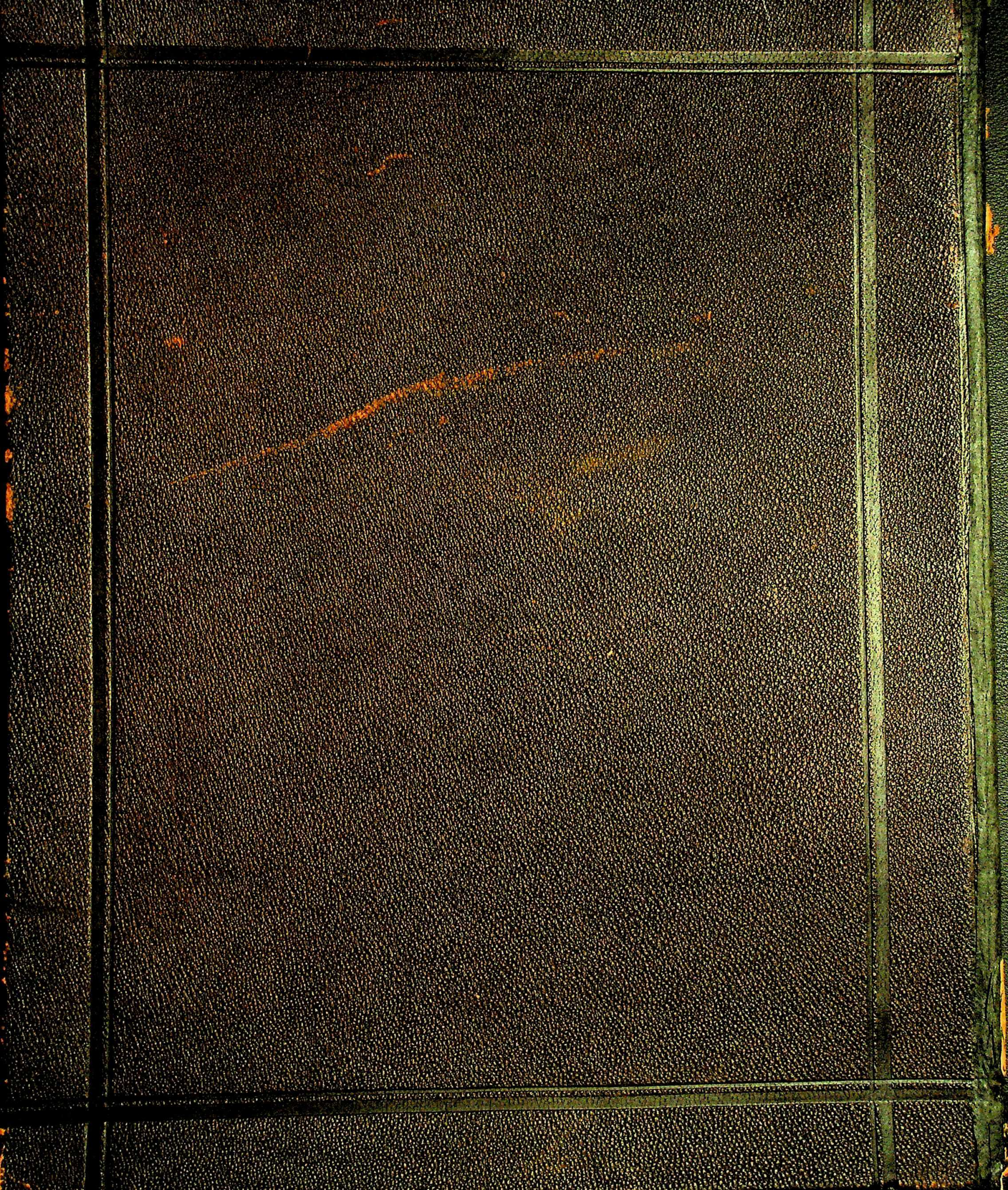
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